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THE FIRST COURSE IN MATHEMATICAL STATISTICS *by C. C. Craig*

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A PUBLICATION FOR THE STATISTICAL PROFESSION

LETTERS TO THE EDITOR

Dear Sir:

It is discouraging to find someone of the professional stature of W. Edwards Deming falling into such naive sophisms as are represented by the first two paragraphs of his letter on TV ratings in *The American Statistician* for October. It is all the more discouraging in that a) he is obviously quite convinced by his own arguments and b) his final conclusions having reference to problems of survey sampling on which he is outstandingly competent, are quite valid (and not at all dependent on the arguments of the first paragraphs). I use the word "sophism" advisedly and with no slanderous intent, following the definition "an argument embodying a subtle fallacy, but without intent to deceive" (Webster's New International Dictionary, Second Edition, Unabridged, entry *sophism*). It is of interest in this connection to note the statement attributed to the Sophist Gorgias: "Nothing is; or if anything is, it cannot be known; or if anything is and can be known, it cannot be communicated" (ibid, entry *Sophist*). If we take Dr. Deming's remarks at face value, a housewife in a grocery store cannot possibly know how many apples she has in a bag or how many dollars she has in her purse, except perhaps by the use of statistical sampling techniques, and consequently she can never hope to complete a purchase.

In view of Dr. Deming's evident sincerity, I have no desire to be flippant, but it is difficult to discuss such an ingenuous line of argument without making it appear ridiculous. The concept of "number," in the abstract, may be ineffable, to use Dr. Deming's terminology, but any particular number, say four, represents a clear-cut, readily communicable concept. If I say, "Mr. Smith has four fingers on his left hand," I feel sure that even Mr. Deming would question the mental capacity of anyone who asserted that he could not understand the sentence, even without seeing Mr. Smith.

Since the concept of "audience size" is basically a simple matter of counting, it can scarcely be considered ineffable. If a theater enforces a policy that "no one will be seated after the first ten minutes," as some movie theaters do when showing a mystery story, the concept of audience size is uniquely defined as the number of people in the theater when the doors are closed. I know very little about the problems of measuring the velocity of light, but I do know that the velocity of light plays a very special role in relativity theory. I know only a little more about the measurement of hardness, but this little includes the fact that it is generally regarded as a very special case of measurement. The core of Dr. Deming's sophism lies in comparing these special cases to the much simpler problem of counting the people in a room. This is known as reasoning by false analogy.

In his fifth paragraph, Dr. Deming gets down to the *real* problem of TV ratings, namely that TV stations cannot lock the doors after the show starts, which complicates the sampling problem considerably. From this point on, I am with him nearly all the way (barring that last sentence in the fifth paragraph). I am even willing to back up a short distance (ineffable as this concept may be) and agree that similar difficulties inhere in the measurement of the labor force and of unemployment. These problems (both TV ratings and labor force) arise, however, from the attempt to apply statistical measurement techniques to situations in the domain of the social sciences, not from any philosophical uncertainty as to how many apples make a dozen. To confuse the problems of *definition* in the social sciences with problems of *measurement* in the physical sciences is sophism of a very high degree of sophistication.

As a social scientist who is also a statistician, I find it particularly regrettable that Dr. Deming should have seen fit to base his conclusions on an extremely vulnerable philosophical derivation, when they can be fully derived from much less abstruse considerations. When a basically technical problem such as this comes under the scrutiny of our national legislature, the arguments in favor of a sound scientific analysis ought not to be prejudiced by the addition of very dubious philosophical embroidery.

Yours faithfully,
Thomas A. Goldman,
Washington, D. C.

Dear Sir:

Most everyone who has done very much writing has had papers rejected. Needless to say, the author of the rejected paper seldom agrees with the judgment of the editor and the referees, yet their decision is final. Readers of the journal almost never hear about a rejected paper because it is not published. This is especially true of statistical papers. Readers thus have no way of knowing whether the editor and referees are making good decisions. Yet anyone who writes about something genuinely new is likely to encounter publication difficulties due to the simple fact that the idea may not be understood. The problem is a very old one, beautifully exemplified by a quotation from Hotelling (1) "—— the papers of this anonymous 'Student' must have seemed a pretty dismal flop to any disciple of Poincaré ——." Fortunately for us, Gosset was able to get his papers published.

On the other hand, editors and referees do a real service. Everything that is written certainly does not deserve to be published, at least the entire paper. The problem then is to increase the number and types of publication possibilities within a single journal. A total of three possibilities are proposed. The articles would be:

1. Acceptable for publication of the complete article.
2. Acceptable for publication of a 250 word abstract only.
3. Acceptable for publication of a 250 word abstract *only on payment of a fee.*

For the first two categories publication expenses would be borne by the journal as usual, but the author of an abstract published in the third category would have to bear part of the publishing expenses. Decision to publish in this category would be made solely by the author; the editor would have nothing to say about this section.

The author of a rejected paper who chose to pay a fee for having his abstract published, should also be allowed to include referees' comments if he chose. The possibility that a referee's comments may appear in print may lead to improved refereeing. The complete anonymity of the present referee system has some distinct disadvantages. At present the quality and tone of their comments are known only to the editor and author. It is a faceless jury whose decision may not be appealed.

This system would allow readers to assess the value of abstracted articles for themselves. Future fate of a given abstract would depend on reader response. Criteria could be established so that if sufficient favorable response were received, the editor's decision would be reversed and the full article would be published; otherwise that would be the end of it, at least as far as current publication is concerned. Rejection of too many good articles however, might indicate that a new editor was needed.

Appropriate criteria for reversing an editor's decision should get some thoughtful study. For example, how would readers vote on articles now appearing in the journal? In other words, how good are current editorial policies? Questionnaires such as (2) tell us nothing about how readers might vote on specific articles. Study of the problem should allow us to formulate a fair and workable policy. It would cost little, however, to give the system a trial. Results of the trial, regardless of its outcome, should be informative.

We are not alone in having publishing problems. Interested readers may wish to refer to some recent letters in *The Lancet* (3).

Sincerely yours,
Robert G. Hoffman,
Gainesville, Florida

1. Hotelling, Harold. The Impact of R. A. Fisher on Statistics. Journal of the American Statistical Association, 46, 35, 1951.
2. Report of the Committee on Publications Policy on the Results of the Publications Questionnaire. The American Statistician. Vol. 13, No. 5, 29, 1959.
3. Letters to the Editor. The Lancet Vol 1, No 7184, 1961.

CORRECTION

The following was omitted from the paper by Stanley Lieberson, "Non-Graphic Computation of Kendall's Tau," *The American Statistician* (October, 1961):

When one or both sets of ranks have ties, the optional checking procedure is based on the following formula:

$$P + Q = \binom{N}{2} - T.$$

These terms are all defined in the paper.

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The President's Column

THE ECONOMIC OUTLOOK SESSION

Martin R. Gainsbrugh

A highlight of the Association's forthcoming Annual Meeting will again be the Annual Economic Outlook Luncheon. The roll call of featured speakers over the past years reads like a "Who's Who" of business forecasters and economic analysts. My memory takes me back to the late twenties and early thirties and the unforgettable contributions of that great triumvirate of business analysts—Ayers, Friday and Edie. In recent years the Association has presented to the ever larger professional audience, which traditionally flocks to the session, economic statisticians (or statistical economists) of equally high repute—Gehard Colm, Oris Wells, Edwin Nourse, Dexter Keezer, John Wilson, Gabriel Hauge, Ezra Solomon, Paul McCracken and Jesse Tapp, to name only some of the participants in recent years.

This year the Association with rightful pride now adds the name of Steve Saulnier to the star-studded roster. Steve tells me he will offer some fleeting recollections based on his long tour of duty in Washington with the Council of Economic Advisers, with particular reference to some of the more historic events of the years he spent as the Council's Chairman. His trip around the world only a few months ago will also form the basis for a series of observations about foreign competition, balance-of-payments difficulties and the like. As Chairman of the function, however, let me assure you that our honored speaker will also deal specifically with the central theme of the luncheon: The Economic Outlook for 1962.

Another added feature of late has been an attempt to secure a consensus of the views on the outlook from the exceptionally well informed cross section of economists and statisticians who faithfully attend this function. To supplement the conclusions of the speaker, those out front have been asked at the session's close to indicate where several economic indicators would be in the year ahead. No attempt was made at precision; instead from a show of hands the degree of optimism (or pessimism) of this select universe was most broadly determined.

Another first this year will be that the outlook consensus will come of age electronically. The Local Arrangements Committee, I'm told, has persuaded the International Business Machines Corporation to install special mechanical facilities that will yield a precise, formal consensus of views at the session's close. Various techniques and devices are being explored, such as polling machines and sensitized cards. This is bound to add to the newsworthiness of the meeting.

By way of preparation for this high occasion I've been asked to release in advance of the luncheon the questions on which a consensus will be sought. I do so gladly, with the proviso that the questions may be changed in form, order and number, as time, world events or the imperatives of electronic aids demand:

(1) Will a downturn in the business cycle occur in 1962: If so, in what quarter?

(2) Will gross national product rise throughout 1962? What will it be in current dollars in mid-'62? In fourth quarter '62?

(3) What will be the index of industrial production for June '62? for December '62?

(Continued on page 21)

1961 ASA MEETING

Members planning to attend the Annual Meeting of the American Statistical Association to be held at the Roosevelt Hotel in New York City, December 27-30, should remember to register in advance in order to avoid delay. Pre-registration forms which have been sent out by the National Office should be returned with the $3 registration fee. One registration covers attendance at sessions of the other societies meeting in New York City at the same time. Hotel reservations should also be made in advance. A rate of $9 for single rooms and $15.50 for double rooms has been arranged at the Roosevelt.

A booklet containing abstracts of the papers to be presented at the sessions of the American Statistical Association, the Institute of Mathematical Statistics and the Biometric Society-ENAR will be available at the registration desk for $1. A varied and interesting program has been arranged by the Program Committee headed by George P. Hitchings. This was published in the October issue of *The American Statistician*, subject to possible changes after the issue went to press. Copies of the joint program containing the sessions of all the societies meetings in New York City will be available to registrants.

Martin Gainsbrugh's Presidential Address and the informal party will take place on Thursday evening December 28. Several special sessions have been arranged. These include a meeting the evening of December 27 to discuss a paper by Allen Birnbaum, "On the Foundations of Statistical Inference"; a session the same evening on "Unemployment Statistics in a Changing Economy"; and a memorial session, in honor of Samuel Stouffer, on "The Present Status and Future Prospects of Social Statistics," to be held the evening of December 29. The traditional Economic Outlook luncheon will take place December 29. The speaker this year is Raymond J. Saulnier of Columbia University, a former chairman of the Council of Economic Advisers.

AAAS ANNUAL MEETING

The American Association for the Advancement of Science is holding its annual meeting in Denver, December 26-31, 1961. This 128th Meeting will include sessions of 18 AAAS sections and of some 75 participating organizations. The American Statistical Association, Section K of the AAAS (Social and Economic Sciences), and the Biometric Society-WNAR are co-sponsoring two sessions, which have been arranged by the Colorado-Wyoming Chapter of the ASA.

The first of these sessions is a symposium, "Problems of the American Highway Operation," to be held the afternoon of December 29. The speakers are Paul E. Irick, Highway Research Board, Ottawa, Illinois, who will discuss "Statistical Design and Analysis at the AASHO Road Test"; G. P. St. Clair, Bureau of Public Roads, Washington, D. C., whose subject is "Problems of National Highway Allocation Study"; Richard M. Zettel, Institute of Transportation and Traffic Engineering, University of California, who will speak on "Economic Problems of the National Highway Program"; Clifford M. Grubbs, University of Colorado, who will discuss "Problems in Costing Highway Service"; and R. E. Livingston, Colorado Department of Highways, "Critique and Discussion." Edward C. Bryant, Westat Research Analysts, will preside.

The second session, scheduled for the morning of December 30, is on "Government Price Statistics." Leland L. Howell, University of California, will speak on "Significance of Urban Retail Structure for Price and Welfare Indexes"; and Leslie Fishman, University of Colorado, will discuss "Welfare Versus Market-Basket Price Indexes." The chairman will be Donald Bentley, Colorado State University.

The American Statistical Association is also participating with the Biometric Society-WNAR and Section K in an "Invited Paper" session the afternoon of December 28. Papers will be presented by George E. Bardwell, University of Denver; Olive Jean Dunn, School of Public Health, UCLA; and F. Reid Creech, University of Wyoming. James Niederjohn, President of the Colorado-Wyoming Chapter of ASA, will preside.

On the afternoon of December 27, a program of Section K, co-sponsored by the American Statistical Association and the National Institute of Social and Behavioral Sciences, will be held. This is a symposium on "Current Problems in Social-Behavioral Research." Frederick F. Stephan of Princeton University will present the Vice-Presidential Address of Section K on the subject, "Social Statistics and the Prediction of Human Behavior." Other speakers are Robert K. Merton, Columbia University; Henry W. Riecken, National Science Foundation; and Duncan Macrae, Jr., University of Chicago. Fitzhugh L. Carmichael, University of Denver, will be chairman.

Other sessions which may be of particular interest to statisticians are those sponsored by Section A of the AAAS (Mathematics). The Society for Industrial and Applied Mathematics and the Association for Computing Machinery are co-sponsoring some of these sessions.

As usual, several sessisons of general interest have been arranged. On the evening of December 27, Glenn T. Seaborg, Chairman, U. S. Atomic Energy Commission, will present the 29th John Wesley Powell Memorial Lecture. The AAAS Exposition of Science and Industry and the AAAS Science Theater, with recent foreign and domestic films, will be prominent features of the meeting.

The Hilton will be the headquarters hotel for the AAAS, with the Brown Palace (including the new Brown Palace tower) the headquarters for Section K. Other hotels at which special rates have been arranged are

the Cosmopolitan and the Shirley Savoy. Further information may be obtained from Dr. Raymond L. Taylor, Associate Administrative Secretary, American Association for the Advancement of Science, 1515 Massachusetts Avenue, N. W., Washington 5, D. C.

President Appoints Committee on Unemployment Statistics

President Kennedy has appointed a committee of technical experts to appraise the status of the information available on employment and unemployment, and to make recommendations for any changes or improvements that current conditions seem to require. The chairman of the new committee is Robert A. Gordon, Chairman of the Department of Economics, University of California. Other members are Robert Dorfman, Professor of Economics at Harvard University; Martin R. Gainsbrugh, Chief Economist of the National Industrial Conference Board and President of the American Statistical Association; Albert E. Rees, Professor of Economics at the University of Chicago; Stanley H. Ruttenberg, Director of the Research Department of the AFL-CIO; and Frederick F. Stephan, Professor of Statistics at Princeton.

In a letter to the President proposing the establishment of such a committee Secretary of Labor Goldberg noted the criticism in the press of the employment and unemployment statistics of the Department of Labor. He stated that the basic methods were established more than twenty years ago, and had been reviewed from time to time by committees representing government agencies, the statistical profession, and Congressional committees. Nevertheless, in view of the importance of the statistics as a guide to public policy, and the need for complete public confidence, he recommended that both the basic concepts and the statistical methods be reviewed again by a committee composed of private citizens with established competence and reputation in this area. He also proposed that the committee consider suggestions made by various users of the statistics for collecting additional information or changes in presentation. Finally, he suggested that the committee look into methods used by other countries in developing their statistics of unemployment and report on their comparability with those of the United States.

In appointing the committee the President stated, "The statistics of employment and unemployment are of vital importance as measures of the economic health and well-being of the nation. They serve as guides to public policy in the development of measures designed to strengthen the economy, to improve programs to re-employ the unemployed, and to provide assistance to those who remain unemployed. It is my objective to maintain and enhance the quality of our statistics in this and in all other fields of government, so that the public may have the highest degree of confidence in them."

The committee will report to the President and Secretary Goldberg when they have finished their work, summarizing the results of their review and incorporating any recommendations which they wish to make.

Census Advisory Committee Appoints Subcommittee on Criteria and Principles

A group has been appointed to study the criteria for selecting Census Bureau projects and the principles used in executing them. William H. Shaw, Chairman of the Census Advisory Committee of the American Statistical Association, appointed a Subcommittee on Criteria and Principles for this purpose at the meeting of the full Committee on October 16, 1961. Chairman of the Subcommittee is Geoffrey H. Moore; other members are Joseph S. Davis, Lester R. Frankel, and Frederick F. Stephan.

For some time the Committee has felt a need for a statement of these criteria and principles, but it now has immediate use for such a statement in its continuing task of reviewing the Bureau's "Projects for Consideration." It believes, moreover, that many of the principles will apply to other Government agencies as well as to the Census Bureau. The Subcommittee expects to make a preliminary report in the spring of 1962.

This work is in line with the Committee's function, which is to advise the Bureau of the Census with a view to promoting improvements in its procedures and statistics, particularly as they affect members of the American Statistical Association and other users of statistics.

Federal Statistics Users' Conference

The Fifth Annual Meeting of the Federal Statistics Users' Conference was held at the Statler-Hilton Hotel in Washington on September 28-29.

Donald R. Hobart, Senior Vice President and Director of Research, The Curtis Publishing Company, speaking at the September 28 luncheon session, reviewed the needs for improvement in Federal statistics as seen by an executive who has been using them for 39 years to help guide business decisions. Mr. Hobart pointed out that business has always been active in matters relating to the formation and distribution of Federal statistics and that it has often pioneered in the development of kinds of statistical information later produced by the Federal Government on an expanded scale and a regular basis.

Mr. Hobart paid tribute to FSUC for effectively contributing to the improvement of Federal statistics and cited several priority areas for future effort. Among these were: (1) the development of a dictionary or index of Federal statistics—"an invaluable tool," (2) continued encouragement of improvement in timeliness, (3) securing more effective use of existing data sources, such as the data collected by Internal Revenue Service and Bureau of Old Age and Survivors Insurance, (4) the development of more adequate data on the procurement activities of the Federal Government, and (5) making a constant review of the usefulness of statistical products and means employed in collecting them to ensure economy in statistical programs.

Walter W. Heller, Chairman of the Council of Economic Advisers, addressing the September 29 luncheon session, drew attention to new kinds of informational needs which have appeared in the wake of growing concern about the long-run growth of the economy. Noting that less than half the rise in output since 1900 can be accounted for by increased inputs of labor and capital, Mr. Heller suggested that more detailed information on man-hours inputs are needed

as well as an expansion of statistics relating to research and development activities. He also suggested that steps should be taken to establish a set of National Wealth Accounts compatible with the National Income and Product Accounts, that capacity data as well as production data should be a part of the Annual Survey of Manufactures, and that job vacancy data as well as unemployment data should be part of the regular information on employment and unemployment.

Referring to recent attacks on unemployment statistics, Mr. Heller declared that there is a continuing need to defend existing statistics against "biased broadsides and barbed innuendoes such as some of the recent vulgar attacks on the competence and integrity of the Bureau of Labor Statistics and the Bureau of the Census."

The round-table discussions covered: (1) Flow of Funds Accounting: Are Users Overlooking a Valuable Tool? (Arthur O. Dahlberg, U. S. Economics Corporation, Chairman); (2) Balance of Payments Statistics: What Do They Show? (Bert Seidman, AFL-CIO, Chairman); (3) New Developments in Retail Trade Statistics (Myron S. Silbert, Federated Department Stores, Chairman); (4) Statistics of Economic Growth (Gerhard Colm, National Planning Association, Chairman); (5) Federal Transportation Statistics: Needs and Problems (Frederick N. Sass, The Pennsylvania Railroad Company, Chairman); and (6) County Business Patterns: An Underdeveloped Resource (Richard M. Allerton, National Association of Broadcasters, Chairman).

A major additional feature at this year's Annual Meeting was the dinner session at which Julius Shiskin, Chief Economic Statistician of the Bureau of the Census, discussed the new publication "Current Business Cycle Developments."

A special meeting of the Anticipations and Intentions Statistics Committee discussed the Census-FRB Consumer Intentions Survey. The purpose of the Committee session was to obtain a clearer understanding of the nature of the objections to the survey voiced by Sindlinger and Co. Mr. Albert Sindlinger reviewed the work of Sindlinger and Co. in the consumer intentions field and argued that the Census-FRB Quarterly Survey of Consumer Buying Intentions has had a deleterious effect on his business both directly and indirectly. Mr. Conrad Taeuber, Assistant Director of the Bureau of the Census, reviewed the history of the Census-FRB Survey and pointed out that it originated as a result of the Federal Reserve Board's interest in consumer buying intentions as an indicator of future trends of consumer purchases of housing and durable goods. He pointed out that Census has a long record of refusing to tack marketing queries onto the CPS.

New Trustees were elected to fill expired terms in the business, labor, and nonprofit groups. Newly elected Trustees are: business group—Richard M. Allerton, National Association of Broadcasters (reelected), and A. Arthur Charous, Sears, Roebuck & Company (reelected); Mrs. Casilda V. A. Wyman, Farm Journal, Inc., was elected to replace Mr. Gordon A. Hughes, Scott Paper Company; labor group—Ben B. Seligman, Retail Clerks International Association (reelected), and Lazare Teper, International Ladies' Garment Workers' Union (reelected); nonprofit group—Herbert Stein, Committee for Economic Development (reelected), and Wesley L. Tennant, Stanford Research Institute (reelected). George B. Hurff, Associated University Bureaus of Business and Economic Research, was elected to replace Howard L. Stier, American Marketing Association. Miss Ingrid C. Kildegaard, Advertising Research Foundation, was elected to replace Thomas C. Fichandler, Twentieth Century Fund.

Herbert Stein, Committee for Economic Development, was elected Chairman of the Conference. A. Arthur Charous, Sears, Roebuck and Company, was elected Vice Chairman from the Business Group; Angus H. McDonald, National Farmers Union, was reelected Vice Chairman of the Farm Group; and Bert Seidman, AFL-CIO, was reelected Vice Chairman from the Labor Group.

NSF Fellowships Announced

The National Science Foundation is again offering graduate and postdoctoral fellowships as one means of promoting the progress of science. As in previous years, the National Academy of Sciences-National Research Council will advise the Foundation in the election of candidates for the 1962-63 fellowships, and is appointing committees of outstanding scientists to evaluate applications. Final selection will be made by the Foundation, with awards to be announced March 15, 1962.

Fellowships will be awarded for study in the mathematical, physical, medical, biological, and engineering sciences; also in anthropology, psychology (excluding clinical psychology), geography, economics (excluding business administration), sociology (not including social work), and the history and philosophy of science. They are open to college seniors, graduate and postdoctoral students, and others with equivalent training and experience. All applicants must be citizens of the United States and will be judged solely on the basis of ability.

Applicants for the graduate awards will be required to take the Graduate Record Examination designed to test scientific aptitude and achievement. This examination, administered by the Educational Testing Service, will be given on January 20, 1962, at designated centers throughout the United States and certain foreign countries.

The annual stipends for graduate Fellows are as follows: $1800 for the first year; $2000 for the intermediate year; and $2200 for the terminal year. The annual stipend for postdoctoral Fellows is $5000. Limited allowance will also be provided to apply toward tuition, laboratory fees, and travel.

Further information and application materials may be obtained from the Fellowship Office, National Academy of Sciences-National Research Council, 2101 Constitution Avenue, N. W., Washington 25, D. C. The deadline for the receipt of applications for regular postdoctoral fellowships is December 18, 1961, and for graduate fellowships, January 5, 1962.

SMU Establishes Statistics Department

Southern Methodist University has established a new Department of Mathematical and Experimental Statistics and Statistical Laboratory in the Graduate School. Faculty members include Drs. Paul D. Minton

and Vanamamalai Seshadri, assisted part-time by Mr. Del West and Mr. Mack Usher.

Coursework leading to the degree of Master of Science will be offered, including courses in mathematical statistics, experimental statistics, probability, sampling theory and design of experiments.

Departmental assistantships are available.

For further information, write to Dr. Paul D. Minton, Department of Mathematical and Experimental Statistics, Southern Methodist University, Dallas 22, Texas.

Florida State University Expands Statistics Program

Beginning in September 1962, the Department of Statistics at the Florida State University will expand its graduate program to study and research leading to the Doctor of Philosophy degree in statistics. The success of the present program, currently limited to study for the Master of Science degree in statistics, has led to the approval of the new advanced training. The curriculum will be modified and expanded to include advanced work in statistical inference and decision theory, stochastic processes, advanced probability, multivariate analysis, operations research, special topics in biometry, theory of general linear hypotheses, non-parametric statistics and sequential analysis. Advanced courses will be offered in alternate years. The program leading to the Master of Science degree will be modified to permit both the thesis and non-thesis types of programs.

The new program will be assisted through the recent addition to the staff of Dr. Vincent Hodgson from the London School of Economics and Political Science. Dr. Hodgson joins Drs. Ralph A. Bradley, Frank Wilcoxon, Richard G. Cornell and S. K. Katti in the Department of Statistics. Additional faculty appointments within the next two years are anticipated.

Facilities have been greatly improved through completion of a new mathematical sciences building in which instructional, laboratory and office space was designed for use of the faculty and graduate students in statistics. The new building also houses an IBM 709 computer for research use.

The Department has a limited number of teaching and research assistantships available. Proposals for three-year graduate fellowships are pending and such fellowships should be available for graduate students entering the new program in September. Interested students are invited to write to Dr. R. A. Bradley, Department of Statistics, the Florida State University, Tallahassee, Florida for further information.

Appointments at Iowa State

Several faculty appointments in the Statistical Laboratory and Department of Statistics of Iowa State University have been announced. C. Philip Cox, formerly of the N.I.R.D., Shinfield, England, has joined the staff as Associate Professor. He will be teaching and conducting research in the area of biological statistics.

Dr. Dewey L. Harris and Dr. Donald K. Hotchkiss have been appointed Associate Professors. Dr. Harris will be consulting, teaching and doing research in the area of Genetics Statistics. Dr. Hotchkiss will be consulting, teaching and doing research in the area of statistics applied to animal nutrition.

Dr. J. N. K. Rao has been promoted to the rank of Assistant Professor. In his new assignment he will be teaching and conducting research in survey sampling.

Symposium on Redundancy Techniques for Computing Systems

A symposium on Redundancy Techniques for Computing Systems will be held on February 6 and 7, 1962, sponsored by the Information Systems Branch, Office of Naval Research. This symposium will be held in the Department of the Interior Auditorium, C Street between 18th and 19th Street, N. W., Washington, D. C.

The objective of the Symposium is to focus attention toward new ideas, research and developments which may lead to the introduction of redundancy techniques into forthcoming computing systems. It is apparent that many information processing systems of the future will be of such size that conventional methods of fabrication and of maintenance will be completely infeasible. Computers for space applications have reliability requirements which are presently not achievable without use of redundancy. Thus, some form of logical redundancy must be introduced if practical systems are to be operated. Accordingly, it is planned to present in a single symposium a collection of related papers concerning suggested new techniques for the use of redundancy in computing systems. This should permit relative evaluation of such techniques with respect to their probable future utilization in various aspects of the computing field. The program will consist of papers invited from many of the organizations engaged in appropriate research and development activities.

Attendance is open to all interested technical personnel. Further information and a preliminary Symposium program may be obtained by contacting: Miss Josephine Leno, Code 430A, Office of Naval Research, Washington 25, D. C.

Illinois Offers Quality Control Course

The fifteenth annual basic short course in Quality Control by Statistical Methods will be presented by the Division of University Extension of the University of Illinois in Urbana from January 29 through February 8, 1962. Intensive work will be given in the fields of control charts, acceptance sampling, and related topics. The course is designed for those in the areas of design, production, procurement, management, quality control, and inspection.

For further informaton, write to: Professor John A. Henry, Mechanical Engineering Building, Room 130, University of Illinois, Urbana, Illinois.

Center for Research on Economic Development Established

The Center for Research on Economic Development (CRED) was established by the University of Michigan in June, 1961, to undertake and facilitate studies of the economic development of underdeveloped countries, of its determinants and consequences, and of the national and international programs designed to accelerate and guide it.

The Center is primarily engaged

in research, though it also provides some advisory services as well as non-credit training in research methods. It is a university-wide organization, drawing on the resources and facilitating the research and teaching of many different units. Instruction in the various disciplines and professions important for economic development is provided by the established departments of the University. In particular, the Department of Economics offers a doctoral program in development economics.

Professor Samuel P. Hayes has been appointed as director of the Center for Research on Economic Development for a three-year term, effective with the beginning of the academic year 1961-62 and ending June 30, 1964. Professor Hayes was director of the Foundation for Research on Human Behavior, in Ann Arbor, from 1953-60; and has been a professor of economics in the College of Literature, Science and the Arts since 1959. He came to Ann Arbor from the Mutual Security Agency, where he was Assistant Director, in charge of Far East economic aid programs. He previously had served in the Department of State, in the planning and setting up of the Point IV Program (Technical Cooperation Administration), and in Indonesia, where he was Chief of the U.S. Special Technical and Economic Mission.

An Executive Committee for the Center for Research on Economic Development was also appointed, comprising: the director of the Center, ex officio; Dean Roger W. Heyns, College of Literature, Science and the Arts, ex officio; Dean Floyd A. Bond, School of Business Administration; Prof. Gardner Ackley, Department of Economics; Dean Allan F. Smith, Law School; Prof. Stanley A. Cain, School of Natural Resources; Prof. Ferrel Heady, Department of Political Science and Institute of Public Administration; Prof. Rensis Likert, Institute for Social Research, and Prof. Robert E. Ward, Department of Political Science.

Federal Civil Service Examinations

The Federal Service Entrance Examination will be given in cities throughout the country on January 13, February 10, March 17, April 14, and May 12, 1962. This examination is designed primarily as an avenue through which young persons of promise, including statisticians and economists, may enter the Federal service. Federal agencies made about 7,000 appointments last year from this examination to career positions located in Washington, D. C., and throughout the United States. Entrance to sixty occupational fields is offered through this one examination.

The examination is open to college seniors and graduates, regardless of major study, and to persons who have equivalent experience in professional, administrative, technical or other responsible work. Juniors who expect to receive their degree within 21 months may compete for a limited number of employment opportunities, to be effective after graduation, with a possibility of summer employment between their junior and senior years. Starting salaries will be either $4,345 or $5,355 a year, depending on the qualifications of the candidates. In addition, a limited number of Management Internships with starting salaries of $5,355 and $6,435 will be filled from this examination. These positions are offered to people with management potential and involve formal training programs for periods ranging from a few months to 18 months after the appointment. Most management intern positions are located in the Washington, D. C., metropolitan area.

Examinations for economists at above-entrance levels have also been announced. These include general economists and economists in the following specialized fields: business, international trade and development, fiscal and financial, transportation, and labor. Salaries range from $6,435 (Grade GS-9) to $13,730 (Grade GS-15). Competitors will not be required to report for a written test but will be rated on the extent and quality of their experience and training.

Applications for the Federal Service Entrance Examination to be given January 13, 1962 must be received by December 21, 1961. Other closing dates for applications are January 25, March 1, March 29 and April 26, 1962. Applications for Management Internships will not be accepted after January 25. No closing date has been specified for applications for the higher grades of Economist. Further information about the tests and how to apply are given in Civil Service Announcements No. 265 (Entrance Examination) and No. 255 (Economist). These may be obtained from Civil Service regional offices, many post offices, college placement officers or from U. S. Civil Service Commission, Washington 25, D. C.

INTERNATIONAL STATISTICAL ACTIVITIES

Costa Rica

The General Bureau of Statistics and Censuses of the Ministry of Economics and Housing has initiated the publication of a journal, *Revista de Estudios y Estadisticas*.

The journal will publish analytic and methodological studies, and will include contributions from non-government scholars, particularly from countries in Central America. The editorial board is headed by Rodrigo Bolaños Sanchez, Director General of Statistics and Censuses.

Issues of the *Revista* will be grouped in Series according to subject matter. The first issue, which appeared in July 1961, is designated Number One of the Demographic Series, and includes papers which were presented at the Third Seminar on Demography, which was held at San Jose on January 25, 1961.

Union of South Africa

The SOUTH AFRICAN STATISTICAL ASSOCIATION held a Conference on October 6th, 1961. The venue was the Main Hall, Iscor Recreation and Social Club, Pretoria, by invitation of the Management of the S. A. Iron and Steel Industrial Corporation, who were hosts for the day.

A series of lectures was given by members of Iscor's staff.

1. Introductory Review of Statistical Work at Iscor—Mr. R. V. Wallach.
2. Toepassing van Statistiese Metodes op die Interpretasie van sommige Psigomotoriese Toetsprestasies—Mr. J. L. A. Rossouw.
3. Statistical Models of Labour Turnover——Mr. G. L. S. Kriek.
4. Die Waarde van Kwaliteitsbeheer as 'n Bestuurstegniek—Mr J. D. du Toit.
5. Die Gebruik van die Elektroniese Rekenmasjien vir Statistiese Analises, Toegelig met Voorbeelde, nl. Regressievergelykings en Sistematiese Steekprofnem-

ing—Mr. J. C. Engelbrecht.

6. Praktiese Implementering van Variansieanalise—Dr. C. F. Crouse.

7. A Test for Physical Strength of Coke and Related Statistical Problems—Dr. H. S. Sichel (Statistical Consultant to Iscor).

Dr. Sichel's paper expounds an entirely new method of treating the problem under consideration.

About seventy-five members of the Association attended out of a total membership of some hundred and twenty.—*Professor J. E. Kerrich, University of the Witwatersrand, Johannesburg.*

USSR

Professor Michael Ptukha died October 3, 1961, in Kiev, at the age of 77. He was a Corresponding Member of the USSR Academy of Sciences, and a member of the Academy of Sciences of the Ukrainian SSR. Professor Ptukha was a member of the International Statistical Institute and had been a member of the American Statistical Association.

Social Science Institute

The creation of an INTERNATIONAL SOCIAL SCIENCE INSTITUTE next year in Vienna has been proposed by a working party of experts from eleven European countries who met at Unesco House in Paris on September 21 and 22.

The proposed institute would take up social problems involving European countries. In its early stages, it would study the conditions, machinery and social consequences of economic change as well as various methods of planning and incentives used by countries with different economic systems.

The institute, which would carry out studies involving different branches of the social sciences on an international scale, is intended to bring about constant collaboration by researchers from all European countries. It would organize meetings and exchanges, gather documentation and publish work executed by national institutes on the basis of its plans and methods.

The working party proposed that, at first, the institute might be operated by the International Social Science Council with the Council forming an executive committee composed of qualified members, including representatives from Austria, the host country. In a later phase, the institute could be given independent status. Decisions in this respect will be taken at Vienna next year by a general assembly with the task of establishing the statutes, programme and budget of the future institute—*UNESCO, Paris.*

Medical Documentation and Statistics

Approximately 250 people, mostly German, attended the INTERNATIONALES SEMINAR FÜR MEDIZINISCHE DOKUMENTATION UND STATISTIK, held at the Free University of Berlin from 16-27 October, 1961. Foreign participants came from the United States, Sweden, Switzerland, Holland, England, Italy, Austria, Belgium, Greece and Denmark. Some of the statisticians known to Americans who participated were Lee Herrera, New York; Armitage, London; Martin, Brussels; Linder, Geneva; and Martini, Bonn.

The first week was devoted to a rather intensive "course" in statistics for medical use, given largely by Professors Linder of Geneva; Heite of Marburg; and Nacke of Bielefeld. Dr. Nacke is the director of the Deutsche Gesellschaft für Dokumentation, the moving force behind the organization of the meeting.

Two main topics occupied the second week: the conduct of clinical trials, and the application of computers to problems in medicine, medical documentation, and physiology. The points of view expressed divided largely along language lines. The English-speaking group were in favor of double-blind type clinical trials, with emphasis on randomization for assigning patients to various treatment groups. The German-speaking participants were in favor of single-blind trials, with the physician knowing which drug had been administered to each patient. There was evidence of some movement toward agreement by the end of the meeting particularly with respect to using the patient as his own control.

The "machines" portion of the meeting considered machine diagnosis of illness (which had both its proponents and opponents), and the use of computers to assist in the interpretation of analogue type data such as electrocardiograms and electroencephalographs. Examples were given of computer "model building" for blood circulatory problems, and for handwriting simulation and identification.

The meeting facilities were good, the meeting being held in the new anatomy theatre of the University, built through a Ford Foundation grant. The city of Berlin (west) held a reception for the participants, served them wine and snacks, and provided some free tickets to performances at the brand new opera house, Schiller Theatre, Musiksaal of the music school, and various other theatres.—*Dr. Marvin A. Schneiderman, National Institutes of Health.*

PERSONAL NEWS

J. STANLEY AHMANN, formerly a member of the staff of the Colorado State University Research Foundation, has been appointed Assistant to the President of Colorado State University, and is in charge of institutional research.

ALBERT V. ALHADEFF's Reserve Unit in Chicago—the 322d Logistical Command—was called to active duty on October 1 and sent to Fort Lee, Virginia.

JAMES H. BEAIRD has been appointed Assistant Professor of Education and will be responsible for the areas of research methodology, statistics and psychometrics in the College of Education of the University of Toledo.

HARRY H. BELL is now First Secretary (Financial Advisor) in the U. S. Mission to the European Communities at Brussels.

WARREN S. BLUMENFELD has left the Technical Developments Department of Science Research Associates, Chicago, Illinois, to resume doctoral work in Industrial Psychology at Purdue University. He will be employed as a Research Assistant in the Division of Educational Reference (Assistant Editor, Purdue Opinion Panel).

SAMUEL LOVITT BROWN has been appointed Statistician (Economics) in the Office of the Assistant Director for Research and Development, Bureau of the Census.

PHILIP BRUMBAUGH's new position is that of Economic Analyst with the Supply Department of Humble Oil & Refining Company, Houston, Texas.

WILLARD E. CARLSON, Associate Manager of Research, St. Regis Paper Company, has been transferred from Watertown to West Nyack, New York. His duties are essentially unchanged.

WAYNE F. CASKEY, formerly with the Housing and Home Finance Agency, has transferred to the Administrator's Advisory Council, Veterans Administration.

HENRY P. CAULFIELD, on leave of absence from Resources for the Future, Inc., is Assistant Director of the Technical Review Staff, Office of the Secretary, Department of the Interior.

JOSEPH A. CAVANAUGH has recently resigned as a Technical Advisor in Statistics in the International Cooperation Administration and is now employed in the

(Continued on Page 23)

FEDERAL STATISTICAL ACTIVITIES

SSA Cooperative Research and Demonstration Grant Program

The cooperative research and demonstration grant program of the Social Security Administration was authorized by the Social Security Amendments of 1956. For fiscal year 1962, Congress has appropriated $700,000 for the support of research and funds for a small staff to administer the program.

The program encompasses grants, contracts or cooperative arrangements with universities and other nonprofit agencies, public and private, for the support of research or demonstration projects relating to the prevention and reduction of dependency, coordination of planning between private and public welfare agencies, or improvement in the administration and effectiveness of programs carried on or assisted under the Social Security Act and related programs. Members of an advisory panel review the projects and recommend priorities to the Commissioner of Social Security.

An article by Ida C. Merriam in the September issue of the Social Security Bulletin presents the philosophy underlying the social welfare research grant program and the progress made in the first nine months of its operation, and indicates some of the possible future lines of its development. Reprints of the article, including a list of the 16 projects receiving grants this year, may be obtained from the Division of Program Research, Social Security Administration, Department of Health, Education and Welfare, Washington 25, D. C.

New Series on Commercial Bank Deposits

The Board of Governors of the Federal Reserve System has prepared a new series estimating daily average gross time deposits and U. S. government demand deposits of all commercial banks for the period 1947 to date. Member banks of the Federal Reserve System account for the largest part of commercial bank deposits, and the member bank component is based on regular reports of deposits for reserve purposes. Estimates for nonmember banks are based on ratios of nonmember deposits to country member bank deposits derived from regular Reports of Condition and interpolated for intervening periods. These ratios are applied to daily average deposit figures reported for country member banks to provide nonmember estimates for current periods. Historical data were published in the August 1961 issue of the Federal Reserve Bulletin and are available from the Board's Division of Research and Statistics. Current figures appear with the daily average money supply statistics, monthly in the Bulletin and semimonthly on the money supply press release. (Edward Fry, Banking Section, Division of Research and Statistics, FRB)

New Report on Business Cycle Developments

The first issue of a new monthly report entitled "Business Cycle Developments," released by the Bureau of the Census, has been well received. The new report, prepared primarily for specialists in business-cycle analysis, summarizes many of the available economic time series in convenient form for short-time economic analysis and interpretation. It supplements other reports of the Department of Commerce which provide data for analyzing current business conditions.

The presentation and classification of series in this report follows the business indicators approach. The experimental work for this report, carried out in collaboration with the National Bureau of Economic Research is described in their publication "Signals of Recession and Recovery" (NBER Occasional Paper No. 77). The classification of series and the business-cycle turning dates are those designated by the NBER.

The unique features of the report are the arrangement of series according to their usual timing relations during the course of the business cycle and the inclusion of special analytical measures and historical cyclical comparisons that help in evaluating the current stage of the business cycle. These measures are made possible by processing on electronic computers.

The report is available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at $4.00 per year (single copies 40¢). (Julius Shishkin, Bureau of the Census)

Major BLS Programs for 1962: Summary of Characteristics

A revised tabular summary of its major programs has been issued by the Bureau of Labor Statistics. Among the characteristics of programs shown in the summary are coverage, reference period, nature and time of release, number of respondents and method of collecting reports, detail of data available, and special characteristics and uses of the data. There are also references to publications in which detailed descriptions of the programs are to be found.

A limited supply of this fourth revised tabular summary entitled "Major BLS Programs for 1962: A Summary of Their Characteristics" is available for distribution. Requests should be made to the Bureau of Labor Statistics, Department of Labor, Washington 25, D. C. (Abe Rothman, Chief, Office of Statistical Standards, Bureau of Labor Statistics)

CSC Improved Personnel Statistics Program

In a move to develop better statistical information on the Federal work force, the Civil Service Commission is instituting an improved personnel statistics program to be implemented next January 1. Agencies are being asked to supply data from which the Commission can establish and maintain a 10-percent sampling of the Federal work force.

Employee social security numbers will be used in determining which employees will be in the sample. Numbers ending in 5 will fall into the sample and remain there. This method of selection will provide a randomly chosen permanent sample of 10 percent of the Federal work force. Agencies will send CSC social security account numbers for all

their employees who are U. S. citizens and for the foreign nationals they employ in the 50 States, District of Columbia, and certain other areas. Employees without social security numbers will be assigned numbers.

Information provided by the 10 percent statistical sample will furnish better insight into such matters as promotion and development patterns; movement of employees by occupation, agency, geographic location, age, etc.; and continuity of employment. (Flora Nicholson, Chief, Employment Statistics Office, Civil Service Commission)

Output Per Man-Hour in the Private Economy in 1960

The Bureau of Labor Statistics has just issued a release extending its indexes of output per man-hour for the total private economy and the major sectors, agricultural, nonagricultural, manufacturing, and nonmanufacturing. This release, entitled "Output per Man-Hour in the Private Economy in 1960," extends through 1960 the major tables presented in BLS Bulletin 1249, "Trends in Output per Man-Hour in Private Economy, 1909-1958."

Output per man-hour as used in the BLS study refers to the constant dollar value of goods and services produced in relation to the hours of all private industry workers engaged in production. Its concept is comparable with that of gross national product. Two separate series are shown for man-hour and related output per man-hour measures. One set is based primarily on establishment reports on payroll hours; the other on labor force reports from a sample survey of households.

Copies of the release may be obtained from the Division of Productivity and Technological Developments, Bureau of Labor Statistics, Washington 25, D. C. (Leon Greenberg, Division of Productivity and Technological Developments, Bureau of Labor Statistics)

Income Tax Data for Metropolitan Areas

"Statistics of Income—1959, Individual Income Tax Returns" presents extensive income and tax data for the 100 largest standard metropolitan statistical areas. The 100 areas are those, within the 50 States, having the largest population based on the 1950 census and conforming to the 1959 definitions for standard metropolitan statistical areas as developed by the Bureau of the Budget.

The standard metropolitan statistical area data include number of returns, adjusted gross income, selected sources of income, taxable income, and tax liability for each of the 100 areas. Also, the number of returns, adjusted gross income, exemptions, taxable income and tax are classified by size of income for each of the 100 areas.

This volume of Statistics of Income is now available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. for $1.00 a copy. (Helen F. Desmond, Internal Revenue Service)

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The following session, sponsored by the American Statistical Association and the American Economic Association, is scheduled for Wednesday, December 27 at 2:30 P.M. in the Commodore Hotel, at the Annual Meeting in New York City:

THE NEW
ENCYCLOPEDIA OF THE SOCIAL SCIENCES

Chairman: Alvin S. Johnson, The New School for Social Research

Papers: Developing the Idea of a New Encyclopedia
Frank X. Sutton, The Ford Foundation

Publishing the new *Encyclopedia*
Jeremiah Kaplan, The Free Press of Glencoe, Inc.

Progress and Plans for the New *Encyclopedia*
W. Allen Wallis, The University of Chicago

Discussion from the Floor

PRACTICAL ORGANIZATIONAL PLANS FOR A COMPLETE UNIVERSITY COMPUTING SERVICE[1]

T. A. BANCROFT, Iowa State University

Introduction

It is intended in this paper to discuss only the organizational aspects of university computing programs from an administrative viewpoint. No attempt will be made to discuss the relative merits of various electronic computing facilities or their ancillary equipment (rented, bought or constructed), or the technical problems relating to computer-oriented numerical analysis and programming.

It seems obvious that considerations of alternative organizational plans for a university computing program should be guided by a clear understanding that universities will differ markedly in their present and future requirements in the computing sector. Large universities may have quite different requirements than medium-sized or smaller universities or colleges. Again, universities which are heavily oriented in their research programs towards the physical sciences and engineering may have different requirements than those whose major research programs are in the biological sciences, agriculture, the social sciences and the humanities. Large universities, of course, may have computing requirements in all these fields. Universities may differ as regards interests and availability of staff in mathematics, statistics and computing who are qualified to work in computer-oriented numerical analysis, programming and machine language. Similarly, universities may differ as regards interest and availability of staff in physics and/or electrical engineering who are qualified to work in computer electronics involving logical design, switching theory, computer construction, research on component parts, maintenance, etc. Other things being equal, universities may still differ in their abilities to provide financial resources for the necessary space, facilities and staff for a computer program to meet user requirements. Finally, universities may differ with regard to the existing computing organizational structure (if any) and the status of knowledge about and extent of experience in administering the existing computing program (if any).

The recent phenomenal development and improvement of electronic computers and programming procedures, and the realization of their importance in scientific research, education, automation, and in the processing of university records, have properly resulted in universities acquiring computer facilities and establishing computing programs. In many cases, however, due primarily to the rapidity of the growth and change, still underway, many universities have been able to make only ad hoc and tentative organizational plans. In many such cases the responsibility for the university computing program has been assigned to some university department or agency which assumed the initiative in promoting the program and/or was able to provide needed computing service staff and in many cases even provide a large share of the financial support, usually from an off-campus source. In other cases computers, acquired primarily for Business Office and Registrar Office work, have been made available for scientific research service computations on a part-time basis, which may have meant going to a second and even third shift.

A Computing Service of a Statistical Institute

There is one very real exception to the developments in organizational arrangements discussed above. A few universities in the United States have statistical institutes or statistical laboratories with institute status, predating the advent of digital computers by many years and assigned the responsibilities of providing both a university-wide computing service and a university-wide statistical consulting service to research staff. As an example, the Statistical Laboratory at Iowa State University was established as an institute at that university in 1933 to absorb and expand the functions of a Mathematics Statistical Service dating from 1927. These two were the first in the United States, as far as is known to the author, to make use of punched-card equipment as well as desk calculators in a university-wide computing service. It is true, of course, that these computing facilities were quite primitive as compared to even a small present-day digital computer. It is also true that the computations were initially mostly what is now considered data processing in nature and were confined primarily to statistical analyses of data from experiments and sample surveys in the biological, agricultural and social sciences. As pointed out later, the nature of the computations has become increasingly sophisticated and varied and scientific computing is currently done for all research segments of the university.

In universities with strong statistical centers, including a university-wide computing service such as described above, it would seem natural, at least in the beginning, to consider a digital computer as simply adding powerful facilities to an already well established computing service. At Iowa State, for example, an IBM 650 was added to the other computing facilities of the Statistical Laboratory Computing Service in February 1957 and has since had its memory capacity doubled. Also in the summer of 1959 the construction of the basic Cyclone, for which the Illiac was the prototype, was completed and made available as another facility to the same centralized Computing Service. Future plans include in-

[1] Invited paper presented at the 6th College and University Machine Records Conference, May 7-10, 1961, Pennsylvania State University.

stallation of a 16,384-word core memory in the Cyclone this summer and then replacement of the IBM 650 by an IBM 7070-1401 computer now on order (as soon as one can be made available.)

There are the advantages of experience and continuity in expanding an existing centralized computing service, based in a statistical center, rather than starting a completely new computing service. However, at many universities, research staff in the physical sciences and certain fields in engineering still make little or no use of statistical consulting services, whereas considerable use may be made of such services by the biological, agricultural and social sciences and certain other fields in engineering.

With a few exceptions, research staff in the biological, agricultural and social sciences are primarily interested in closed-shop [2] computing services. In general the quantitative work for these sciences flows through statistical consulting to numerical analysis to programming to data preparation in punched-card or tape form and then on to the computer. A considerable amount of the computations involve only the ancillary computing equipment and never make use of the main digital computer.

In many cases, and in particular for large scale surveys, much of the computing is concerned with processing of great masses of data. In such cases the research staff members have little interest in or time for performing the coding, editing, programming or computing themselves. Even if they were interested, such work would result in an inefficient use of the time of these research staff members. While it is becoming increasingly important for biological, agricultural and social scientists to become acquainted with the capabilities of digital computers—through short courses, computing instruction integrated with existing courses, say in statistics, or formal computing courses—it is doubtful that many will be or should be interested in completely open-shop [3] computing service arrangements. Since much of the numerical analysis, programming and computing comes as a result of the statistical consulting service, it is advantageous to such staff to work with only one university service agency, i.e. an agency providing statistical as well as numerical analysis, programming and computing services.

The physical sciences and certain areas in engineering may make little or no use of a university statistical consulting service, but will often need consulting or assistance in numerical analysis and programming. On our own campus this need is met in part by Statistical Laboratory's scientific computing group but for most physical science projects is dealt with by a Numerical Analysis-Programming Section of the Ames Laboratory of the Atomic Energy Commission, which is located on campus. This arrangement arose because most of the research in the physical sciences and certain areas in engineering is supported by the Atomic Energy Commission. It is of course quite important that the physical and engineering scientists become well acquainted with the capabilities of digital computers. In fact some of these staff members, in particular graduate students and junior staff concerned with strictly scientific computing, rather than the processing of masses of data, may well be interested in at least some open-shop computing arrangements. In particular they may wish some experience in programming their own computations and even the operation of the computer. It is doubtful, however, that able research staff in the physical sciences could or should spare much time from their regular research programs on such added activities after becoming acquainted with the capabilities of computers.

Should it be found convenient and feasible to attach (or integrate) the university-wide computing service to a statistical research and service institute on either a temporary or permanent basis, it will be necessary to include provision for both closed- and open-shop users. Also it will be necessary to provide consulting in numerical analysis and programming on non-statistical problems as well as those of a statistical nature.

Background Information

It would seem desirable to obtain detailed information on present and anticipated computing needs of a university before consideration of alternative organizational plans to meet such needs. Such needs might be conveniently classified as (i) general computing needs common to most universities, and (ii) more specialized computing needs which are peculiar to the particular university under consideration. The class (i) presumably would include: administrative data processing such as for the Business, Registrar's and Student Affairs Offices; educational uses of computers; and research computations. The class (ii) for a land-grant university, for example, might include the processing of Dairy Herd Improvement Association records. At Iowa State computations for the Ames Laboratory and the Statistical Laboratory Survey Group projects would also fall in this class.

The analysis of the background information may be facilitated by constructing a flow chart of university computing uses. For example in such a chart the quantitative and analytical servicing of data relating to the biological, agricultural and social sciences for the most part should flow through statistical consulting (where available) to numerical analysis to programming to data preparation and on to the computer. On the other hand, as pointed out earlier, such work in the physical sciences in general seldom involves the statistical consulting phase but includes the others and would be so displayed on the flow chart.

In addition to assessing present and anticipated computing needs, a university should assess its current and probable future resources in staff, space and computer facilities (or funds for acquiring computer facilities) in planning for the future.

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[2] Computing services are performed by the university centralized computing center for university staff members.

[3] Computing services (computer-oriented numerical analysis, programming, etc.) on their own work are done by staff members themselves.

General Organizational Principles

It is true that there exist many widely differing organizational plans for computing in the universities currently having computing facilities and programs. It is also quite likely that a subset of these, and even other possible organizational plans, will work about equally well, *provided* adequate resources are available and the individuals concerned (computing staff, users and administrators) *wish* the particular plan selected to succeed and can work *cooperatively*.

It would appear desirable to select an organizational plan which would: (i) be geared most appropriately to the present and anticipated future computing needs in all areas of the particular university under consideration, (ii) take into account and build on the past and present organizational arrangements, i.e. be evolutionary rather than revolutionary in character, (iii) take into account the financial resources available to the university to provide staff, space and computer facilities for this sector of its overall program, (iv) be uncomplicated in nature in order to minimize the possibilities of friction which may develop because of the interdisciplinary aspects and the non-homogeneous, and possibly conflicting, computing requirements of the users in the different agencies and disciplines of the university, and (v) provide for growth and change.

It is realized that the question, as to whether computing has or has not already developed into a proven academic discipline, is controversial and open to debate. A discussion of the pros and cons of this question is contained in a *Report on a Conference of University Computer Center Directors*, based on a meeting held in Chicago, Illinois, June 2-4, 1960, sponsored by the National Science Foundation and with sessions arranged by the American Mathematical Society. Nevertheless large universities may wish to allow, in their planning, for the possibility of eventually establishing an independent and separate department of computer science with an attached computer laboratory of institute status.

It is becoming a generally accepted experience that a really first rate computer installation at a single center is far more effective than splintered smaller units of mediocre size. Certain exceptions to such centralization will be noted later.

General Sub-areas of Computing

It will be assumed that most universities will have computing requirements in the three general and fairly homogeneous sub-areas mentioned earlier: (i) Administrative Data Processing, (ii) Educational Uses of Computers and (iii) Research Computations. The problem then is to consider various alternative organizational plans designed to meet these requirements and at the same time stay within the resources available to the university for its computing program. It should be realized, of course, that alternative organizational plans will differ according to the size or level of the computing program and may also differ within a given size or level according to the peculiar computing requirements of a particular university.

Alternative Organizational Plans

Small colleges or universities with limited resources may be able to afford only a small digital computer installation with part-time staff and director. In such case it will be desirable to provide time on the computer for work from all three sub-areas mentioned above. Medium-sized or even larger universities, requiring a considerable amount of scientific research computations, and yet limited in resources available for computing, may also find it necessary to provide only one digital computer installation for users in all three sub-areas. In such case it would be necessary to select a computer facility easily adaptable to data processing as well as scientific research computing.

Medium-sized or larger universities with more resources should consider the possibility of a separate computer installation just for administrative data processing services. This kind of unit would ordinarily be attached administratively to the Business Office. Much of the computing for this sub-area will be repetitive in nature and can be highly organized step-wise. Also the needs may call for less sophisticated and more specialized kinds of computing equipment than that required by scientific research computing work. Furthermore Business Office and Registrar's Office staff are in general more agreeable to taking turns behind other such staff than behind research staff, and vice-versa. Still further the related requirements for computer-oriented numerical analysis and programming for a research computing service program may differ considerably in kind and amount from that required by an administrative data processing service. Finally, it is usually geographically convenient to locate the latter service on the ground floor of the main university administrative building, affording quick access to the offices served. On the other hand it should be more appropriate to locate the computer for research service computations geographically with the consulting staff in computer-oriented numerical analysis and programming and the statistical consulting staff (if any).

Separate computer installations and accompanying separate administrative arrangements for the two sub-areas suggested above should be accompanied by exchange arrangements, possibly on an informal basis, to handle peak loads which may occur in either computer installation.

Since the administration of academic educational programs is the responsibility of deans, department heads and curriculum committees at universities the computer educational program could be the shared responsibility of several departments such as mathematics, statistics and electrical engineering. That is, formal and informal courses in data processing, scientific machine computing, computer electronics, etc., might be offered in several departments as the need arises. Computing instruction integrated with certain already established courses could be arranged by the college or department concerned, pos-

sibly with the assistance and advice of teachers of the formal and informal courses mentioned above. One such staff member in each of the several departments concerned might be appointed to a panel of educational consultants in computing to provide assistance and advice on specific educational matters relating to computing. In such case, this panel of consultants should be given at least courtesy staff status in the computing center providing services to research.

Larger universities with adequate resources and a large computing educational program may find it feasible and convenient to acquire a separate computer facility which would be primarily assigned for computing educational use in formal courses, informal short courses, and integrated teaching. In such case the computer facility and educational computing center should be administered in such a way as to serve the educational computing needs of the whole university. In this case the panel of educational consultants, mentioned above, should have staff status in the educational computing center.

There is one kind of situation where the interdisciplinary arrangement just suggested would not be the most desirable one for the computer educational program at a university. If and when computing becomes recognized as a proven academic discipline, it would seem desirable, at least in the larger universities, to establish a separate department of computer science. The computer educational program could then be centralized in this department which, with an attached computing laboratory, could function in a role analogous to that of a department of statistics with an attached statistical institute.

Recommendations

The administrative official responsible in an overall way for the research computing service of the university should be a member of the academic community himself, and should report to an appropriate academic authority, such as a Provost, and not to a purely administrative authority, such as a registrar or treasurer. The administrator responsible in an overall way for the research computing service, should ordinarily have background and academic status in the mathematical sciences (numerical analysis and scientific machine computing). He should ordinarily be given the title of director and have academic status in a department of mathematics, applied mathematics or statistics since he would administer the work of academic staff concerned with consulting and research in computer-oriented numerical analysis and programming. Alternatively, if and when computing develops into a proven discipline, the head of the research computing service would presumably be designated as director of a computing laboratory and head of a department of computer science.

Universities possessing well established departments of statistics and attached statistical institutes already providing a university-wide research computing service, may find it advantageous to continue and strengthen this computing administrative arrangement with the understanding that future growth and development in computing may call for a separate department of computer science with an attached computing laboratory.

The largest computer installations will need, in addition to a director, (i) an operations manager in charge of day-to-day administration of all computing facilities, assisted by (ii) a supervisor in charge of the day-to-day work of operators of peripheral equipment and statistical clerks. In the academic area the director will need a section of computer-oriented numerical analysts and programmers. The work of this section should be supervised by a chief numerical analyst. The number of such numerical analysts and programmers needed will depend, of course, on the size of the installation, the amount and kind of work, the relative number of closed and open-shop users, and the number of numerical analysts and programmers available on campus but external to the computing service staff. Should there be an appreciable number of staff members in various substantive fields over the campus who are specialized in numerical analysis, it would be advantageous to organize a panel of consultants in numerical analysis with at least courtesy staff status in computing, similar to the arrangement suggested for the educational computer use sub-area.

It is the general experience in universities that the present real bottleneck faced in establishing a good computing program is in staffing rather than in acquiring an adequate computer facility. Should a university be fortunate enough to have or to obtain the services of an able senior staff member in numerical analysis, it may be possible to establish a graduate program in scientific computing. Graduate degrees (M.S., M.A., Ph.D.) with specialization in computing could be offered in mathematics or applied mathematics or statistics. Alternatively joint graduate programs could be arranged between two, or among all three, of these departments. In such case some temporary staffing of the numerical analysis-and-programming side of the computing service can be done with half-time graduate assistants or research associates, In time such a graduate training program in scientific computing also would provide trained staff for other university computing centers. Currently at Iowa State we have one research associate, two fellows, and three graduate assistants pursuing graduate work in numerical analysis and scientific computing, principally at the doctoral level. These students provide valuable assistance, under the direction of a senior numerical analyst, to university research staff.

Because of the potential usefulness of computing in most university research activities, it may be desirable to establish an inter-disciplinary advisory committee to advise on policies and procedures for computer services. It is obvious that the members of such a committee must become well-acquainted with, and keep updated on, the computing requirements of the particular university concerned and the opportunities available for meeting such requirements. Both the main user areas and the academic side of scientific computing should be represented on

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THE FIRST COURSE IN MATHEMATICAL STATISTICS

C. C. CRAIG, University of Michigan

Thirty years ago the first course in mathematical statistics at the post-calculus level taught by a specialist in mathematical statistics was a rarity. Now a beginning course with a year of the calculus as a prerequisite is offered by the great majority of the leading colleges and universities and the supply of teachers whose field of research is mathematical statistics, if still inadequate, is vastly greater than it was a generation ago. It is still true that many courses are taught at the pre-calculus level and all too often by teachers of very limited qualifications, but my concern here is not with this kind of course.

But in spite of the general availability of a first course with this requirement, even a cursory acquaintance with what is actually taught in different colleges and universities will impress one with the wide variation that exists. This diversity is of two kinds. There are very considerable differences in the choice of subject matter and there are even greater differences in emphasis and presentation. For the first one has the excuse that the science of statistics is still young and continues to be in a lively flux of development both in breadth and depth. But while I shall try to be reasonably specific about the material I think should be included, I am much more concerned with how such a course should be taught. Though there certainly has been much improvement in my more than thirty years of observation, I believe we have little reason to be complacent and that there are some current tendencies that cry for correction.

These tendencies are not unrelated to what has been happening in the world of mathematics. During the last generation and more, particularly in the United States, we have seen the growth of a cleavage between pure and applied mathematics and an increasing dominance of the pure and abstract as the most approved kind of mathematics. Mathematical statisticians and the courses they teach, whether in a mathematics department or in a seperate department of statistics have been influenced by this development. In fact, as my very acute colleague L. J. Savage has remarked, a number of the current statisticians have become more mathematical than the mathematicians themselves.

Of course to come to any agreement on what is to be taught in a first course in mathematical statistics and on how it is to be taught, requires a consensus as to the objectives of such a course. Not surprisingly, this is where the greatest difficulty lies. But it is also all too common to have assent to a statement of objectives and still have serious differences on the means for realizing them. Even if these differences are not voiced, classroom performance may make the formal assent of little value. I am even of the opinion that many teachers of mathematical statistics simply are not aware of how far they are missing the targets they claim to have set up for themselves.

One issue that has to be faced at the outset has to do with the extent to which an introduction to mathematical statistics is to be regarded as a service course. Even if it is agreed that one of its major functions is to provide an important part of the education of students of most of the sciences, there is still disagreement on how this fact should affect content and teaching methods. There is a segment of teachers of mathematics, some of whom teach mathematical statistics, in whom the suggestion that they should teach a service course provokes a strong negative reaction. They do insist that their subject deserves a high priority for support because of its central position in the advancement of science, but they also insist that they best serve science by teaching mathematics as mathematics, and not as an adjunct to physics or psychology, say.

I am very sympathetic with this point of view. For example, I insist as strongly as anybody that members of the engineering faculty shall not dictate to me what I shall teach and how I shall teach in a course of mathematical statistics for engineers. If I am qualified to give such a course in a good university, I should know these things better than they. I also believe that mathematical statistics has its own discipline, its own set of basic principles, its own methods, and that the instructor's main concern is with teaching these. If he does less, he is short-changing his students and his course should not carry academic credit as mathematical statistics.

But I further believe that the instructor should be very much aware that mathematical statistics is a branch of science. He should be informed of the extent to which its origins and its present corpus have come from attempts to deal with problems arising from man's efforts to understand his universe and control his destiny. I think he should be convinced that his subject will lose vitality and significance unless it maintains contact with and actively contributes to the main stream of science. If he has this knowledge and this conviction, and makes them evident in his teaching, he is in a position to do what the teachers in other branches of science have a right to expect of him when they send students to his course. He can use meaningful examples and illustrations drawn from the real world, which engage attention and carry conviction, to help his students to understand the meaning of the basic principles he is trying to teach and to appreciate their importance. He certainly should avoid letting his course degenerate into a mechanical and uncritical presentation of cook-book methods of handling very specific and limited "practical" problems. But he can teach basic science and mathematical statistics by exposing the process of abstraction used in setting up a mathematical model which retains essential features of a real world problem and then teaching the mathematics of analysis of such models. He does maintain contact with the earth and avoids giving the impression of in-

dulging in the pastime of the medieval scholastics of arguing how many angels can stand on a pinpoint.

Ideally, a statistics or a mathematics department should not be in the position of offering a course in mathematical statistics in response to a need expressed by another department. The teachers of mathematical statistics ought to be aware of the need well before it comes to the point of formal expression by the other department. Of course this means that, at least as a group, they must keep abreast of the contribution statistics can make in all branches of learning. If they really believe in the value and importance of their subject in the education of scientists they will undertake to provide suitable courses before their lack is strongly felt. By so doing they may move toward four objectives: (a) Keeping their institution at least up to date. (b) Accelerating the statistical education of teachers in other departments. (c) Heading off the offering of strictly service courses in statistics by members of other departments who are inadequately prepared. (d) Being able to avoid giving narrowly specialized service courses. To revert to my previous example, one could hope finally to gain assent to the proposition that a first course in statistics for engineers need not be very different from a general first course in statistics. If a class does consist of engineers, it will be helpful to choose illustrative examples from engineering fields. And for engineers, but not exclusively for engineers, one should give more than lip service to Shewhart control charts and to acceptance sampling. Both are enlightening means of teaching basic principles whose value extends far beyond special applications. A teacher who does not see and teach them in this light should not be entrusted with them.

In short, I do not believe that a department of mathematics, or of statistics, should offer service courses of the narrow, specialized kind. Members of other departments, with a real understanding of the role of statistics in science will not want such a course, and an enlightened academic administration, zealous in maintaining high educational standards, would not give its approval. But that, to my mind, is quite different from saying that the only obligation a department of mathematics or of statistics has is to pursue its own special interests untouched by and indifferent to the world of science outside its cloisters. If a department of instruction in a university asks for support on the grounds that it contributes a vital part to the education of students of other disciplines, and insists that that contribution be entrusted to it, it incurs an obligation that extends beyond narrow confines.

I want to examine the nature of this obligation from another highly important point of view, that of the student. At the first course level I do not think that a distinction between students of mathematical statistics and students of other disciplines is very important. Even if they are not aware of it, the commitment of many students at this stage to a particular field is only tentative. I also believe that the teacher of any subject is not doing his best job unless he tries to arouse interest in pursuing his subject further. But this does not mean that a first course in mathematical statistics should be conducted as if its members were all majors in the subject, or that the only students that arouse the instructor's interest should be those that show signs of becoming acceptable candidates for the doctorate in his field. This all too often happens in beginning honors sections, for example.

I would agree heartily that the students most of us give C's and D's do not merit much consideration. Either through lack of capacity or interest they acquire no real grasp of any course of substantial intellectual content. I do consider it unfortunate if a course never ignites a spark in any of its members who have not previously done well and starts them on the road to realizing latent capacities. But our B and A students, who can be interested and who will try to learn, are a different matter. True, only a portion of them are going to choose statistics for a career and certainly only a few can be made into productive scholars. But they deserve to have a course that is designed for them, that carefully weighs the intellectual maturity and body of knowledge they possess, and imaginatively considers how and what they can learn. Too many of our brilliant scholars who teach appear to ignore the fact that they always were exceptionally gifted and to have totally forgotten the earlier stages of their own mathematical learning. They seem to lack awareness that even able students require some time to grow up to mathematics as the study of an abstract system, and that most of them will want to grasp the importance of the content for science.

First of all, I insist the course should be devoted to mathematical statistics, not to the mathematics of statistics. It may be difficult to teach a non-mathematical course in a way that gives the student some understanding but one can try hard and achieve some success. But to make the first course the mathematics of statistics is far more difficult if one's measure of success is the student's understanding and appreciation of what is going on. An able student may do the formal work in such a course quite satisfactorily to the instructor, and effectively learn nothing about statistics. It is to be remembered that my concern is the teaching of statistics. It is quite possible for a student to learn a good deal about statistics from "cookbook" instruction applied to real experimental situations, and then, if he has ability and adequate mathematical preparation, be eager to take a course in the mathematics of statistics from which he really will profit. This is a time-consuming and inefficient process, but it is far more successful than attempting it in the reverse order. One great weakness in the teaching of the mathematics first is the fact that the most of those who advocate it have no real interest that the second half of the job be done at all. They intend to have no part of it.

As a part of the body of science, statistics is by no

means subsumed under its mathematics. In fact, the student of statistics is being introduced to a new world of concepts and a kind of thinking for which he has not been prepared by his previous mathematical training. At the beginning level, if the mathematics is kept within the reach of recipients of a year of the calculus, students have much more difficulty with the statistics than with the mathematics. In fact, for all but really exceptional individuals, any real mastery and feeling of secure possession of the material presented in a first course in mathematical statistics only comes in subsequent courses in which the student is required to use and build on the first course.

One of the most difficult problems in planning such a course is encountered at the outset. How much formal theory of probability is to be presented? To a very large extent the subject matter of the whole course is the application of probability theory to the problems of uncertain inference. An extreme position is that all the student really needs is a sound probability course; he then will be able to make the statistical applications himself. Aside from the fact that this is simply not true, what this statement really expresses in most cases is that if the student ever learns how to use probability theory in dealing with the problems of uncertain inference, he will have to do it on his own or get instruction elsewhere. My present estimate is that a half-semester of introduction to probability in a two-semester course is about right. But this is not best done in one continued dose. It is more effective and satisfying to the student to be led to see why the topics in probability to be formally studied are basic and essential to getting on with mathematical statistics. One cannot avoid some discussion of the foundations of probability but surely one must avoid getting completely beyond the student's depth. Though I am not completely sure, I suppose nobody seriously proposes that a first course in the calculus should be preceded by one in set-theoretic topology.

I believe the student on completion of the course should be in possession of a reasonable amount of statistical methodology and more than a superficial knowledge of how and when to use it. He will have been required to learn the derivations his mathematical equipment enables him to understand. He will have a real grasp of the import of the central limit theorem though he realizes that it has only been made highly plausible. But he will not have been rushed through a lot of material for which there has not been time for thorough discussion, nontrivial examples and exercises for him to do. It is much better to omit topics than to do them in a half-baked fashion. There is no more effective way to insure that the first course will be the last course the student will ever elect than to overstuff him with undigested material. A first course cannot turn out a professionally competent statistician. But it can give him more than a superficial command of a considerable body of tools basic in scientific investigation. If the student is a budding psychologist, say, he will not be, after a year of mathematical statistics, quite unable to design and analyze critically a simple investigation by statistical methods.

As I said earlier, the beginner in mathematical statistics is encountering a new set of ideas and a new kind of thinking which are neither easily nor immediately grasped. After hearing them explained and illustrated in addition to his study of a textbook, he will only learn them by working with them and applying them to carefully selected problems to the point where he can intelligently defend what he has done. I still believe in the value of the old-fashioned recitation, which is more than a rote performance. If the instructor can bear to let someone else talk, if he is not driving to get over the maximum amount of materal, if he is interested in what his students are getting out of his course, if he is interested in getting high standards met, he should take the time for recitation discussion. In terms of the kind of results his better students want, there is no loss of time.

I also believe that the only way the student can get an effective grasp of statistical methods is by applying them to real data. Along with this goes something which is almost beneath the notice of some who give courses in mathematical statistics. This is some instruction in the art of computation, and an effectively enforced insistence on accurate numerical results. It is worse than ridiculous to apply statistical arguments to the results of faulty calculation. This does not take much time but it has to be taught; the students will not learn it themselves. I am assuming that each student will have free access to a desk calculator; this is essential.

If the principles advanced above are accepted for the selection of material and the way it shall be taught, it becomes much easier to agree on a choice of topics to be covered in a two-semester course meeting three times a week. I hope it is clear that I am much less concerned with this choice than I am with the manner of treatment of the subjects chosen. A listing of topics in detail would amount to a full table of contents of a textbook and I do not want to take the space for that. Instead I shall confine myself to a brief sketch that I hope will help to further clarify my views.

The material on probability should be made to appear clearly essential in view of the problems faced by the experimentalist. It should include more than a cursory treatment of sample spaces and random variables defined on them, the basic rules, combinatorial methods, frequency and probability functions, Bayes' rule, and the elementary limit theorems. The standard frequency functions should be thoroughly studied. More of the mathematics of the normal law and the important density functions derived from it can be done than in many of the available texts. Both point and interval estimation and the standard significance tests with their power functions are central. Bivariate and at least trivariate regression must be treated, as well as two or three of the

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ON TEACHING STATISTICS

ROBERT G. HOFFMANN, University of Florida

This article is based on several years of experimenting with various methods of teaching. The course concerned is a 16 class-hour required course for first year medical students in the University of Florida's College of Medicine. The problems involved in teaching the elements of applied statistics to medical students are similar to those of teaching any other students. The content of the course is not unusual except that about the last 4 hours (one-fourth of the total time) is devoted to the design of experiments. More will be said about this later. Before considering teaching methods, however, consider the teaching situation itself.

The Teaching Situation

By definition, teaching involves a teacher-pupil relationship. The teacher's role consists of the following: (1) He is responsible for selecting the material to be included in the course, determining how it is to be presented, and actually presenting it. (2) He is responsible for selecting the textbook used in the course. A good text can contribute materially to the potential value of the course, but a large part of the course's value is determined by the student himself. A poorly organized course without an adequate text is almost a waste of everyone's time. On the other hand, even a well organized course with a good book can only meet the student half way. These are the ideas on which the teaching methods described below are based.

Teaching Methods

Here is how the method finally developed works: A given topic is assigned to be read and is then covered in class. Lectures are confined largely to the theoretical basis of the topic even though this is a course in applied statistics.[1] The aim is to provide understanding of the basis of the topic without, for the moment, regard to how it is applied. Following this, the class is assigned an extremely simple problem to do as "homework." For example, the problem on Student's "t" test consists of the following two questions.

1. Given the following two sets of measurements, compute a test for statistical significance of the mean difference, and compute confidence limits for the mean difference.

Set 1	Set 2
4, 1	3, 2, 5

2. State the assumptions made in the above computations. There are several purposes in assigning a problem of this type. First, it gives the student a chance to concentrate on the technique itself and the assumptions which underlie its use. Second, he is not burdened with a heavy computing problem which may obscure his major hurdle at the moment, learning the technique. Third, these simple exercises are easy to check so they may be returned to the student in a very short time. This is all a prelude to the final feature of the topic. At this point the students are required to obtain data for real problems of their own choice. The instructor only suggests topics which may be of interest. No data are furnished.

These real problems are the core of the course. Several are required, each to involve a different statistical technique. The problems must be submitted in written form to include a real purpose (to do a "statistical analysis" is not sufficient purpose), the data and how they were obtained, the analysis, a statement of the extent the analysis achieved the purpose, and a conclusion. For a given real problem students are allowed to work in groups if they choose. That is, several students may study a given problem and body of data, but each must write and submit a report on his own.

Sources of real problems are almost as varied as the students themselves. Some obtain data from work done in other courses; others obtain data from research projects on which they have worked as technicians, and some obtain data from the scientific literature. The only problems not allowed are those obtained from books.

Since there are no restrictions on the data, some problems involve fairly heavy computing. If the student wishes, the basic computing is done for him. In fact, our statistical office offers computing services for students as long as they are in medical school. The student is required to specify the computations and ordinarily they are confined to sums of squares of deviates or variances.

When the problems are handed in, all computations are checked before they are graded. The grade is based partly on the student's choice of a problem. It is also based on choice of statistical techniques and how they are applied. There is considerable work involved in checking and correcting these real problems, but the time and effort required is very worthwhile.

The book used in this course is in syllabus form [2] and follows the course pattern described above. In each chapter statistical theory is first described and discussed; several applications from real problems are then given to illustrate the technique concerned. The purpose of the illustrations is to form a bridge between theory and application.

As was mentioned earlier, the latter part of the course covers an introduction to experimental design. This is probably somewhat unusual because the course is the equivalent of a 1 credit hour course for one semester without any prerequisite. The approach to experimental de-

[1] Scheduled for trial this fall is a plan to discontinue lectures. Assignments for the entire course will be given at the beginning of the course. Lecture time will be used to discuss anything the students wish discussed and attendance is not compulsory.

[2] Scheduled for publication in 1962 by the Charles C. Thomas Co.

sign is by means of individual degrees of freedom and orthogonal matrices. Matrix theory of course is not taught and the matrices are built up from a "common sense" approach.

The experimental design material serves to put much of the basic statistical material in perspective. It also acquaints the student with the differences between additive effects and interaction. The final real problem must involve a two factor experiment.

Three other methods have been tried, none of which was satisfactory. They included (1) teaching by integrating the statistical material with another course from which the problem material was obtained; (2) teaching by approaching the statistical problems through real problems; and (3) teaching with a mixture of real and theoretical problems with all problems chosen by the instructor. This last mentioned method is the usual method of teaching applied statistics.

Discussion

The most important feature of the teaching method described in this article is that students are required to obtain their real problems themselves. This is quite different from the term paper approach. Most students do the simple exercises well but when it comes to selecting and studying a problem of their own choice, there are considerable differences among them. Some do very well; others not. If they were required to submit only a term paper, they would not have sufficient opportunity to demonstrate their ability to apply the techniques.

Another undesirable feature of the term paper approach is that it is work submitted at the end of the course. If a student has major difficulties in applying the techniques, and some do, no one knows about it until the course is over. The student has little opportunity to learn from his mistakes. This is not true when the real problems are an integral part of the course. There are ample opportunities to discuss mistakes and some are valuable learning experiences.

The trouble with the conventional method of teaching applied statistics, a mixture of theoretical and applied problems chosen by the instructor, is that the student is placed in the role of a technician. There is little opportunity for the student to express his interests and to demonstrate his initiative. His role is one of "pleasing the instructor" by producing the "correct analysis." This is an artificial situation which can exist only in a classroom environment. When the student leaves school he must deal with problems as he finds them, whether they resemble those in his course work or not.

Only a few of the students who take an elementary course in applied statistics will take further work in statistics, hence it seems like a waste of valuable time to require them to do extensive computing. An experienced computer can do the basic computing for a student in a small fraction of the time it takes the student. Those who want to become adept at computing can be trained.

Students' reactions to this type of course vary considerably. Some are stimulated by the challenge and opportunities, and others are somewhat resentful over being required to find their own real problems. This is where the feature of allowing the students to work in groups comes in. Students with high initiative and broad interests can help the others. Towards the end of the course, however, the more able students seem to work together.

UNIVERSITY COMPUTING SERVICE—CONTINUED FROM PAGE 13

this committee. The members should be persons at the professorial level who can and will provide impartial advice on computing matters for the best interests of the *whole* university in a responsible manner, rather than represent the views of special interest groups.

Regular reports on the computing service activities should be made available to the advisory committee by the administrator having overall charge of the computing service. The advisory committee on computer services might also be empowered to arbitrate on any complaints by users on the day-to-day service of the computing center, passing along its decisions and recommendations to the computing administrator after having heard the reasoning on both sides in each case.

In order to keep abreast of the growth and change in computing requirements, and the opportunities available to a university to meet such requirements, it is important that the computing administrator and/or a university computing committee conduct reappraisals of the status of the computing program on campus at frequent and regular intervals. Such reappraisals will benefit markedly by the exchange of information and ideas made possible at such meetings as those of the 6th College and University Machine Records Conference.

Future Annual Meetings of ASA are as follows:

YEAR	*PLACE*	*HEADQUARTERS*	*DATES*
1961	NEW YORK CITY	ROOSEVELT HOTEL	DECEMBER 27-30
1962	MINNEAPOLIS	LEAMINGTON HOTEL	SEPTEMBER 7-10
1963	CLEVELAND	CASE INST. OF TECH. AND WESTERN RESERVE UNIV.	EARLY SEPTEMBER
1964	CHICAGO	CONGRESS HOTEL	DECEMBER 27-30
1965	PHILADELPHIA	BELLEVUE-STRATFORD HOTEL	EARLY SEPTEMBER

QUESTIONS & ANSWERS

Devoted to discussions of conceptual and measurement problems . . . . . by ERNEST RUBIN, U. S. Department of Commerce and American University, Washington, D C.

Bibliographies for Statisticians (and Others)*

In recent decades the scope of statistics has widened extensively in theory and in application. Developments in electronic technology since the end of World War II, as evidenced in the so-called 'giant brain' computers, have provided an impetus to statistical work and have stimulated the statistical exploration of new worlds.

The annual number of articles, papers, books, monographs, reports and pamphlets that are within the statistical domain is in the thousands. These works originate in governments, universities, business, regional and international organizations, and private sources. Further, the rate of increase of these published and processed materials in growing. This proliferation of statistical work creates urgent requirements for systematic, detailed, authoritative and annotated statistical bibliographies.

I have received a number of inquiries for information on statistical bibliographies. Some of the important bibliographies that have appeared in 1960-61, or are about to appear, are listed below. This list is by no means complete; the works cited, however, provide references to statistical bibliographies published prior to 1960.

I hope these references prove useful. Because of the importance of this subject it would be appreciated if readers, here and abroad, would inform me of current developments in this field.

* For related discussions in this section see "Statistics for the General Reader," (October 1956) and "Probability for the General Reader," (December 1958).

Reference List of Selected Statistical Bibliographies, 1960-61

Bibliography of Statistical Textbooks and Other Teaching Material (2nd Edition 1960), Inter American Statistical Institute

Special Surveys of the Labor Force: An Annotated Bibliography (July 1960), Office of Statistical Standards, Bureau of the Budget (U. S.)

Bibliografie (Compilation of bibliographies of more than 100 scholars in statistics (1960), Instituto di Statistica dell 'Universita (Bologna, Italy)

A Bibliography of Statistical Literature 1950-1958, (1961), M. G. Kendall and A. G. Doig (James Thin, Edinburgh)

Guide to Tables of Mathematical Statistics (1961), J. A. Greenwood and H. O. Hartley (Princeton Univ. Pr.)

Input-Output Bibliography 1955-1960 (1961), C. E. Taskier, United Nations, Statistical Office

Bibliography of Nonparametric Statistics (in press Nov. 1961), I. R. Savage (Harvard Univ. Press)

A Basic Bibliography on Marketing Research (2nd Edition, early 1962), R. Ferber and H. Wales (Amer. Marketing Ass'n)

Selected Bibliography of Statistical Literature 1930-1957. By L. S. Deming, in the *J. of Research*, National Bureau of Standards
- I Correlation and Regression Theory, Vol. 64 B, No. 1
- II Time Series, Vol. 64 B, No. 1
- III Limit Theorems, Vol. 64 B, No. 3
- IV (with S. Gupta), Markov Chains and Stochastic Process, Vol. 65 B, No. 1
- V Frequency functions, moments, and graduation, in press

"Index to the Distribution of Mathematical Statistics," F. A. Haight, *J. of Research*, Vol. 65 B, No. 1, National Bureau of Standards

"Bibliography on Sequential Analysis," J. E. Jackson, *Journal of the American Statistical Association*, Vol. 55, No. 291, September 1960

"Bibliography on Simulation, Gaming, Artificial Intelligence and Allied Topics," M. Shubik, *Journal of the American Statistical Association*, Vol. 55, No. 292, December 1960

Variations Between U. S. and Its Trading Partner Import and Export Statistics

Discussion by O. M. Sostad [1]

In the "Questions and Answers" section of the April 1961 issue of this publication, J. Edward Ely discussed differences between the import statistics of the United States for the year 1959 and the export statistics, covering the same flows of trade, reported by the countries trading with the United States. Taking 28 commodity groups, chosen essentially at random, of the 150 commodity groups according to which trade-by-commodity-by-country data are tabulated in "Commodity Trade Statistics" [2], Mr. Ely found numerous discrepancies between the magnitude of the export of a given commodity to the United States recorded by the exporting country and the corresponding magnitude recorded by the United States. He has listed differences of coverage, commodity classification, country designation and valuation as principal sources of such discrepancies and has suggested that a detailed investigation of the precise causes of individual discrepancies might be a useful preliminary to reducing differences of this sort.

The United Nations Statistical Commission has studied the question of eliminating this kind of incomparability. In respect of coverage and country designation the differences among national practices were so deeply rooted in customs laws that it did not appear to be possible to obtain effective agreement on uniform standards. Recommendations on valuation have been made by the Commission and have, particularly among the countries whose trade with the United States is studied by Mr. Ely, been widely adopted except that in the case of some

[1] The author prepared this note while a member of the staff of the Statistical Office of the United Nations. The views expressed are, however, the author's own and do not necessarily reflect the views of the United Nations or its Secretariat.

[2] "Commodity Trade Statistics" United Nations Statistical Papers, Series D, quarterly.

countries, including the United States and Canada, it has been impossible to value imports on a c.i.f. basis. Mr. Ely is thus able to compare imports into the United States valued f.o.b. with exports of other countries also valued f.o.b.

In respect of commodity classification, the United Nations Economic and Social Council in 1950 promulgated the Standard International Trade Classification (SITC) to reduce incomparabilities. Though countries accounting for about 80 per cent of world exports now compile data on the basis of the SITC, governments have, for some commodities, experienced difficulty in adapting their national practices exactly to the requirements of the SITC and so have had to provide, for these commodities, data based on commodity coverage that was approximate only. Where this happens the reason often is that countries cannot make the subdivisions of the headings of their own national classifications necessary to obtain exact agreement with the international standard. This may occasionally be because the required subdivision would reveal information which it was forbidden by law to make public, either for commercial reasons or for reasons of national defense; but more usually it is because making the subdivisions would require importers and exporters to record, in their declarations, distinctions not required by the national customs tariff, thus putting on traders an added burden which countries are reluctant to impose. The United States, for instance, has been unable adequately to represent imports in 35 of the 150 SITC groups;[3] of these, 4 are included in Mr. Ely's sample. In the case of the exports of the United States, 51 SITC groups could not adequately be approximated [3] and, furthermore, legal restrictions prevent the publication of the full detail of the destinations of a number of commodities.

Since the SITC was first promulgated, a large number of important trading countries, but not including the United States, have unified their customs tariff nomenclatures. In 1960 the Statistical Commission approved revisions of the SITC which, among other improvements, made each SITC heading an exact sum of headings of the unified tariff nomenclature. These changes are expected to remove, for the countries concerned, most of the technical difficulties associated with matching national classifications to the SITC. Difficulties associated with national policy will, however, remain.

Mr. Ely has kindly made available the detailed statistics on which his discussion is based so that the author of this note could determine which of the more important discrepancies referred to by Mr. Ely could readily be explained by reference to existing official statistics. Of the 28 groups entering the sample, 4 are, as stated above, not compatible with the United States import classification (Schedule A); their coverage is officially described as differing from the SITC standard. Group 672, which is in the sample, includes precious stones; these are a special case in external trade principally becausq so much of the trade is by parcel post and the degree to which parcel post shipments are analysed by commodities and countries varies widely. Three groups of chemicals appear in the sample. The classification of chemicals in the original SITC has proved to be impossible for governments to follow with much exactitude; basic changes have been made in the revised version of the SITC to minimize these difficulties.

In 14 of the groups in Mr. Ely's sample, other than those discussed above, all discrepancies are either small as percentages of the trade they affect or small in value terms (though some of these produce large discrepancies in percentage terms because the trade they affect is itself small). Due to their minor interest, these discrepancies were not examined in detail.

Of the 28 groups in the sample, six containing major discrepancies remain. This is a rather small number on which to base general conclusions, but the principal causes of each of these discrepancies can be identified. Two of the six groups are residual: 292 Vegetable matter n.e.s. and 663 Mineral manufactures n.e.s. The discrepancies found in them are the result of differences, plus and minus, in other groups to which groups 292 and 663 are residual. Explaining those of the discrepancies in these groups which are large thus required the examination of a considerable number of other groups. The large discrepancies in 292 are the result principally of: (a) inclusion of "peat moss, fertilizer grade" in 292 by Canada and in 561 by the United States, and (b) the exclusion of "rattan split, etc." from 292 by the Federal Republic of Germany and its inclusion by the United States. Turning to 663, United States imports of "mica film and splittings" from Japan are classified in 272 but in the Japanese export statistics appear under 663 with the name "mica manufactures."

The sample includes group 642 Articles of Pulp, Paper, Paperboard. It is much the least important of three groups containing paper and paper products, the most important of which is 641, Paper and Paperboard. The imports of the United States in 641 were, during 1959, nearly fifty times as important as those in 642. United States imports in group 892, Printed matter, were almost three times those in 642. This indicates that minor misclassifications among these three groups will account for important discrepancies in group 642. Exports to the United States of 642 recorded by Canada are, for instance, only a quarter of the corresponding U. S. import figure, but if the totals of 641, 642 and 892 are compared, the difference is less than one per cent. There is a similar situation in the trade from France to the United States. Furthermore there are some rather important differences between Japan and the United States in the allocation of commodities among groups 641, 642 and 899; for instance paper-covered umbrellas and parasols are classified in group 899 in Japanese exports and in group 642 in United States imports.

[3] See "Commodity Notes" to "Foreign Trade by Commodities", Series C, quarterly, Organization for European Economic Cooperation.

Incomparabilities are more prevalent in group 714, Office machinery, than in any other of the sample. This group includes dictaphones, etc., and electronic computers, all products in which technical change is very rapid. In the case of computers, the change tends to blur the distinction between office machinery and scientific instruments; in the case of dictaphones it blurs the distinction between office equipment and other sound recorders, including recorders for home and professional use, such as in music. The group Musical instruments, 891, also contributes major discrepancies to the sample. Again electronic equipment is largely responsible because of the blurring of the line between wireless equipment and gramophones and their equipment. The countries cooperating in the effort described above to unify tariff nomenclature are aware of this problem and steps they take to sharpen definition will automatically be reflected in the revised SITC.

Discrepancies in group 732, Motor vehicles, between the statistics of specific pairs of countries are due chiefly to the prevalence of entrepot trade in motor vehicles: Canada and Belgium-Luxembourg, for instance, re-export to the United States significant numbers of vehicles not of their own manufacture.

Besides examining the comparability of statistics for individual commodity groups, Mr. Ely also compares total imports of the United States from certain of its trading partners with the total exports to the United States reported by those partners. The only large discrepancies of this kind are largely explained in the case of Canada, by the inclusion of shipments to the United States of uranium ore and silver excluded from the United States import data and, in the case of Denmark, by the designation of the United States as the country of destination of food shipped directly to United States Forces in Europe, whereas these shipments do not enter the United States import statistics at all.

The examples concerning motor vehicles and the food exports of Denmark indicate that differences in country designation are, perhaps, a more important cause of discrepances than Mr. Ely foresaw. Other important factors are differences in coverage and in commodity classification.

It has, furthermore, appeared to be quite possible to explain, on the basis of existing published data, the main reasons for discrepancies of the sort shown by Mr. Ely's sample. The nature of the administrative and technical foundation of trade statistics, discussed earlier in this note, makes it doubtful whether the very considerable effort required to obtain more detailed explanations of discrepancies would justify itself by making possible a great improvement in comparability. Countries are now beginning to compile data according to the revised SITC. Two or three years will be required before they will fully have benefited from the improvements in comparability it is designed to make possible. It would appear to be clear, therefore, that there would, in any case, be no point in undertaking a detailed study of discrepancies before countries have fully accomplished the adjustment incident to the revision of the SITC.

THE PRESIDENT'S COLUMN—CONTINUED FROM PAGE 1

(4) Will the consumer price creep (an advance of 1%) continue in '62?

(5) Will unemployment (as % of civilian labor force) turn down appreciably in 1962? Or increase? Remain the same?

(6) Will the balance-of-payments problem in '62 grow more acute, remain in status quo or will it moderate?

(7) Which of these will be the principal contributing factors leading to the next recession:

(a) balance-of-payments difficulties leading to a dollar crisis;

(b) inventory imbalance arising from labor-management difficulties;

(c) inadequate profit margin (wage-cost-price-squeeze);

(d) deficit spending;

(e) Federal surpluses achieved well before full employment;

(f) disarmament;

(g) automation;

(h) overhang of excess industrial capacity;

(i) foreign competition;

(j) chronic unemployment.

(8) In the light of the economy's performance thus far in the 1960's, have you cut back on your economic models for 1970, left them untouched or increased them?

(9) Will the Federal Reserve raise rediscount rates in 1962? If so, in what quarter? Should it?

(10) Is the monetary policy currently being pursued (however defined) correct, in your opinion? If not, should credit be further tightened? Eased?

CHAPTER NOTES

Atlanta

The Chapter has elected the following officers for the 1961-62 year:

President—Professor JOHN L. FULMER Georgia Institute of Technology

Vice-President—E. L. HARLING, Research Director, Rich's Inc.

Secretary—MRS. LILLIAN J. LEE U. S. Bureau of Labor Statistics

Treasurer—ROGER L. BURFORD, Assistant Professor, Georgia State College of Business Administration

Arizona

A meeting was held on November 3rd at the Executive Inn, Tucson. The meeting was preceded by a cocktail hour and dinner.

Central Indiana

A dinner meeting was held at Purdue University on October 5th. Professor M. S. Patel, Division of Mathematical Science, Purdue University, spoke on "Group Screening with More than Two Stages."

Central New Jersey

W. R. Allen, Past President of the Chapter and a Statistical Consultant and Research Associate at Princeton University, was the speaker at the evening meting held on October 24th. Mr. Allen's subjects was "Destructive Testing for Lot Acceptance When Lots Contain a Single Unit." Based on the work he has been doing in connection with the national space and nuclear defense efforts, the speaker described some procedures for utilizing data from destruction tests on models to estimate the functional parameters of the actual item.

Chicago

At the September 26th luncheon meeting Rosson L. Cardwell, Associate Director and Director of Research for the Hospital Planning Council for Metropolitan Chicago, spoke on "The Key Role of Basic Research in Metropolitan Hospital Planning." His analysis dealt with a description of the present system, prediction of growth if present trends continue, evaluation of the present system and achievement of an improved system.

Robert Eggert, Marketing Research Director of the Ford Division of the Ford Motor Company and a Past President of the Chicago Chapter of both the ASA and the American Marketing Association, was the speaker at the dinner meeting held on October 5th. Mr. Eggert's topic was "Short and Long-Range Factors Affecting the Auto Outlook." He pointed out several favorable factors and predicted a high level of automobile sales for 1962.

A luncheon meeting was held on October 10th at which Dr. Donald Bogue, Department of Sociology, University of Chicago, and Associate Director of the Population Research and Training Center, spoke on "Chicago's Population Prospects." Dr. Bogue dealt with projection for the next 20 years and a comparative population analysis of Chicago and other Great Lakes port cities.

The speaker at the October 24th luncheon was Virgil W. Peterson, Operating Director of the Chicago Crime Commission. Mr. Peterson spoke on "Measurement of Crime in Chicago." He emphasized the difficulty of statistical measurement, but pointed out the important improvements in reporting of crime since the recent reorganization of the Police Department.

Cincinnati

The Cincinnati Chapter held their first meeting of the year on September 26, 1961. The meeting was preceded by a luncheon.

Mr. George P. H. Styan spoke on the subject: "Application of Markov Processes to Marketing." Mr. Styan is a member of the Mathematics and Statistics Department of Procter and Gamble Company.

Cleveland

The following officers have elected for the 1961-62 year:

President—JULIO N. BERRETTONI, Statistics Department, Western Reserve University.

Secretary-Treasurer—WILLIAM E. COX, JR., School of Business, Western Reserve University.

Columbus

Dr. Frank A. Peters, director of measurements and evaluation for Ohio State University's counseling and testing center, spoke at the October 18th meeting of the Columbus Chapter. His subject was "The Effectiveness of the American College Testing Program on Placement at Ohio State University." Dr. Peters described the results of a study comparing the correlation of grades in college freshman mathematics and English courses with two different placement tests given to students upon admission to Ohio State University.

Officers of the Columbus Chapter for 1961-62 are:

President—DR. MERTON D. OYLER, Ohio State University.

First Vice President—DR. ARTHUR E. MACE, Battelle Memorial Institute.

Second Vice President—MR. JAMES E. O'LEARY, Ohio Chamber of Commerce.

Secretary-Treasurer — DR. MIKHAIL V. CONDOIDE, Ohio State University.

Dayton

The following officers have been elected for 1961-62:

President—THERESA FRICKE

Vice President—MRS. FREDA W. KURTZ

Secretary-Treasurer—STANLEY J. BACK

Harrisburg

Mr. Emmett H. Welch, new Director of the Bureau of Statistics in the Pennsylvania Department of Internal Affairs, was guest speaker at the first fall meeting of the Harrisburg Chapter of the American Statistical Association. Mr. Welch spoke on the future plans of his Bureau at a luncheon-meeting held Thursday, October 26th, at Castiglia's Restaurant in Harrisburg. He was introduced by Dr. William Seyler, Deputy Secretary of Internal Affairs.

Mr. Welch said that increased attention will be paid to the problem of securing more adequate statistics on personal income on a county basis, and that the Bureau will make comparisons of various methods of projecting county population estimates, with actual census figures, in order to determine which of various methods used in the past resulted in least error.

The speaker, who retired earlier this year from the Federal service after 21 years' experience in economic and statistical research, previously worked for seven years as Director of Research and Statistics for the Pennsylvania State Emergency Relief Board and Department of Public Assistance. Mr. Welch served as president of the Harrisburg ASA Chapter in the 1938-40 period and as president of the Washington, D. C. Chapter in 1953.

Milwaukee

The speaker at the meeting on October 3rd was Dr. Robert C. Craig, Associate Professor of Education at Marquette University. Dr. Craig's subject was "Distribution-Free Statistics in Classroom Experiments."

At the November 7th meeting Newell Meyer of the *Milwaukee Journal* Research Bureau spoke on "Statistical Problems in Compiling the Consumer Analysis."

Dr. George E. P. Box, Chairman of the Department of Statistics, University of Wisconsin, is scheduled to speak at the December 5th meeting. His tentative subject is "Some Applications of Bayes' Theorem."

Nebraska

The newly-elected officers for 1961-62 are:

President—JOHN BIRCH, University of Nebraska, Lincoln, Nebraska

Vice-President—JAMES F. HANLEY, Economics Department, Creighton University, Omaha, Nebraska

Secretary-Treasurer—L. A. SWIGER, University of Nebraska, Lincoln, Nebraska

New York

The Annual Business Outlook Meeting, sponsored by the Business and Economics Section, was held on October 9th. Dr. Simon Hutner, Economist and Business Adviser, was the speaker. Roger Williams, Luria Brothers & Co., Inc., was chairman.

The topic of the October 23rd meeting, sponsored by the Biostatistics Section, was "Genetic Factors in Primary Hypertension and Coronary Artery Disease—A Reappraisal." Dr. Morton Schweitzer, Columbia University School of Public Health, was the speaker. The discussants were Professor Howard Levene, Department of

Mathematical Statistics of Columbia University; Dr. George Hutchison, Harvard University School of Public Health; and Dr. Edmond A. Murphy, Johns Hopkins University School of Medicine. The chairman was Samuel Shapiro, Research Director, H.I.P.

The Physical and Engineering Sciences Section sponsored a meeting on October 30th. Karl Fry, Executive Secretary of the Engineering Manpower Commission, spoke on "The Manpower and Compensation Structure within the Engineering and Scientific Professions." Larry Lipperman of International Business Machines discussed "Advanced Scientific Statistical Computer Applications." Arthur H. Walner, Materials Laboratory, N.Y. Naval Shipyard, was chairman.

"Empirical Bayes Approach to Statistics" was the subject of the November 9th meeting sponsored by the Statistical Techniques Section. Herbert E. Robbins of Columbia University was the speaker, and Nathan Morrison, Associated Hospital Service of New York, was chairman. The discussants were Professor Howard Levene, Columbia University, and R. B. Murphy, Bell Telephone Laboratories.

The New York Chapter has published in one volume the papers presented at the sessions of the 1960 annual meeting of the American Association for the Advancement of Science which the Chapter sponsored. These were sessions on "Hospital Statistics in Community Planning" and "Some Statistical Problems in Social Insurance Research." The collection has been published for the Chapter by the Bureau of Applied Social Research, Columbia University, under the title, "Social Insurance—Some Problems for Statistical Research," and may be purchased for $1 from the Bureau of Applied Social Research, Columbia University, 605 West 115th Street, New York 25, N. Y.

Pittsburgh

On October 10, 1961, Dr. Max Halperin of Knolls Atomic Power Laboratory, General Electric Corporation, discussed "Interval Estimation on Non-Linear Parametric Functions." He presented an improved method of constructing confidence intervals for functions of two parameters, when these parameters possess estimates that are jointly normally distributed with known variance-covariance matrix.

On November 7, 1961, Dr. Mindel C. Sheps, Professor of Population Statistics in the Graduate School of Public Health, University of Pittsburgh, spoke "On Problems in the Clinical Evaluation of Drug Therapy." She described the wide-spread tendency to adopt new treatment methods on the basis of unscientific testimonials, and gave reasons why a more rational basis for evaluation treatment has not yet been completely established.

Saint Louis

"How to Mislead with Statistics," or "Keep Your Eye on the Numbers, not the Figures," was the subject of the talk given at the October 19th luncheon meeting by Donald E. Paul, Laclede Gas Company. Mr. Paul gave some actual examples of things used at various times to fool many of us.

San Francisco

Those attending the Chapter's October luncheon meeting found themselves contributing more than the usual amount of audience participation to the proceedings of the day.

Immediately after dessert (if not before for some) the group adjourned to the nearby Bank of America ERMA Center, one of the largest and most modern of computing installations in the country. The peripatetic speaker of the day was Mr. Melvin Gienapp, Vice-President and Head of Systems and Equipment Research of the Bank of America, N.T. and S.A. He and five of his assistants shepherded some fifty Chapter members in small groups past the IBM 7070, the satellite computers, card readers, printers, the translator that permits the 7070 to "speak" to ERMA and the GE 100 which processes 280,000 checking accounts held by 90 branch banks in the system.

After hearing the presentation of Mr. Gienapp and his able assistants, the answers to the many questions asked by Chapter members, and after watching several demonstrations of the equipment, appreciation was general that this field visit had provided an extraordinary opportunity to watch the processing of mass data in action.

Southern California

The Chapter opened the season with a dinner meeting on September 28th at the Fox Hills Country Club in Culver City. The speaker was R. G. Paul, Assistant Chief of Reliability Assurance of the Douglas Aircraft Company, Santa Monica Division, and the winner of the Silver Knight award as the most interesting speaker of the previous year. Mr. Paul spoke on "Monitoring a Reliability Program." The newly elected officers were installed at this meeting. They are:

President—J. D. Wilkinson
Vice-President—K. G. Spiker
Secretary—R. J. Jessen
Treasurer—J. M. Kilcourse

An unusual meeting was held on October 26th at the Cockatoo Restaurant in Hawthorne. Charles J. Hirsch, Chief Accountant and Assistant Secretary of the Golden Nugget, Inc., Las Vegas, Nevada, spoke on "Controls in the Gaming Industry." Mr. Hirsch illustrated with slides the quality control methods used in a gambling casino.

Washington, D. C.

The first meeting of the new season on October 23rd presented one of the deans of Sovietology, Naum Jasny, speaking on stages of Soviet industrializaton. Discussants were Leon Herman, and Holland Hunter, both expert Sovietologists. The audience included substantial representation from the State Department, a class from Howard University, and a class from the Navy Department. One interesting comment made by the speakers was the remarkable improvement in objectivity and apparent accuracy of published Soviet statistics made in the past few years.

PERSONAL NEWS—CONTINUED FROM PAGE 7

National Institute of Mental Health as a Survey Statistician. He will work in the general field of professional manpower statistics in mental health programs.

JESSE CHENG has been employed since September 5 in the Division of Wages and Industrial Relations, Bureau of Labor Statistics, Department of Labor, where he is working mainly in the field of data processing.

BRYANT CHOW received an M.S. in Statistics from Rutgers University in June 1961 and is presently working for a Ph.D. in Statistics at Virginia Polytechnic Institute.

THEODORE COLTON, formerly a research fellow at the London School of Hygiene, is now on the staff in the Department of Preventive Medicine at Harvard Medical School.

SALVATORE COMITINI has been appointed Assistant Professor in the Department of Business and Economics of Arlington State College, Arlington, Texas, where he will teach courses in Economics and Business Statistics.

WILLIAM C. COPELAND has left the Department of Research and Statistics of the American Hospital Association to do graduate work in the Department of Biostatistics, School of Public Health, University of Minnesota.

GILBERT DEMENTIS recently joined the Consumer Market Research Department of Kimberly-Clark Corporation as Director of Sales Research. He was formerly associated with the Inland Steel Company of Chicago.

DONALD D. DILLMAN is a Physical Distribution Analyst with the Charles Bruning Company, Inc., Mount Prospect, Illinois.

LOUIS I. DUBLIN has been engaged since his retirement from the Institute of Life Insurance in the revision of his volume on suicide.

PAUL ELDRIDGE, formerly with HEW, has joined the Projections and Forecasting Staff of the Statistical Techniques Branch, Statistics Division, Internal Revenue Service, as a Supervisory Statistician.

FREDERIC E. FISCHER is now working on a doctorate in Educational Measurement and Statistics at Harvard.

RAM GNANADESIKAN, who is a Member of Technical Staff at Bell Telephone Laboratories, has accepted a part-time teaching position as Adjunct Associate Professor in the Institute of Mathematical Sciences of the New York University beginning in the fall of 1961.

T. N. E. GREVILLE, formerly Chief, Operational Mathematics Office, U. S. Army Quartermaster Corps, has been appointed

Vice President of the S. A. Miller Co., Consulting Actuaries, Washington, D. C.

CHARLES E. HALL will be employed by the Biometric Laboratory of George Washington University. The Laboratory provides experimental design and data analysis services for National Institute of Mental Health grantees.

JOHN W. HAMBLEN, formerly Director of the Computing Center at the University of Kentucky, has moved to Southern Illinois University as Director of the University Data Processing and Computing Center. The new SIU Center is responsinble for all administrative, research, and instructional uses of electronic data processing and computing machines at both the Carbondale and Edwardsville Campuses.

JERRY R. HAUPT, formerly Operations Research Analyst at Vickers, Incorporated, Troy, Michigan, is now a Member of the Technical Staff of the Radio Corporation of America at RCA Laboratories Princeton. He is assigned to the Operations Research Group.

ROBERT W. HEATH began his new job at the Educational Testing Service, Princeton, New Jersey, on October 1. His title is Professional Associate and his work is research on the evaluation of programmed learning materials and the study of new science curricula.

DAVID M. HEER, formerly of the Population Division of the Bureau of the Census, has accepted a position as Lecturer, Department of Sociology and Social Institutions, University of California, Berkeley.

ROBERT W. HILLER has accepted an appointment as Mathematical Statistician with the Statistical Research Division, Bureau of the Census.

VINCENT HODGSON has completed the Doctor of Philosophy degree at the London School of Economics and Political Science and has been appointed Assistant Professor in the Department of Statistics at the Florida State University, Tallahassee. His area of specialization is stochastic processes and queueing theory together with an interest in operations research.

CARL R. HOTTENSTEIN is now an Economic and Statistical Analyst in the Research and Statistics Staff Division, Department of Revenue, Pennsylvania State Government.

ABNER HURWITZ, formerly of the Bureau of Labor Statistics, has been assigned by the International Statistical Programs Office of the Bureau of the Census as Price Statistics Adviser to the Government of Thailand under the ICA program.

SHIRLEY KALLEK, Supervisory Statistician with the Industry Division, Bureau of the Census, has resigned.

EDWARD L. KAPLAN has taken a leave of absence from the University of California Lawrence Radiation Laboratory and is beginning a year as Associate Professor of Mathematics at Oregon State University.

ROBERT W. KENNARD is now at the University of Delaware as Associate Professor of Mathematics and Statistics.

LLOYD A. KNOWLER has returned to his position as Professor of Mathematics at the State University of Iowa after a year's leave of absence during which he was assigned by the U. S. International Cooperation Administration to the Indian Statistical Institute at Calcutta as Statistical Quality Control Adviser.

STANLEY M. KOLSAN, formerly with General Merchandise Company, Milwaukee, has been working since August as Supervisor of the Sales Research and Forecasting Section of the Marketing Research Division of The Toni Company, Merchandise Mart, Chicago.

HAROLD W. LAWSON, Jr., has left the Research Programming Department of Remington Rand UNIVAC (Philadelphia) to accept a position in the Advanced Programming Technology Group of IBM in Poughkeepsie.

S. DAVID LEONARD, formerly Assistant Professor of Psychology at Cornell College, is now Assistant Professor of Psychology at the University of South Florida in Tampa. He will be teaching Experimental Design and Methodology.

DANIEL B. LEVINE, who has been serving as Chief of the Special Surveys Branch, Demographic Surveys Division, Bureau of the Census, has been designated Assistant Division Chief.

J. DAVID LIFSEY received the Master of Arts degree in Mathematics and Statistics from the University of Georgia in August, and began work in September as a Mathematician with the Climatic Center, USAF, Air Weather Service, Asheville, North Carolina.

P. JOHN LYMBEROPOULOS has been an Assistant Professor of Statistics, College of Commerce, Ohio University, Athens, Ohio, since September.

ALBERT MADANSKY has been awarded a fellowship to the Center for Advanced Study in the Behavioral Sciences for 1961-62.

ARTHUR J. McDOWELL, formerly Assistant Chief of the Medical Statistics Division of the Office of the Surgeon General of the Department of the Army, is now Chief of the Health Examination Survey Branch, National Health Survey Division, National Center for Health Statistics, HEW.

ROBERT McGINNIS has resigned his position at the University of Wisconsin to accept a Professorship (Sociology) in the Department of Sociology and Anthropology, Cornell University, Ithaca, New York.

KENNETH R. MacKENZIE is working in Statistical Quality Control, Motorola Semi-conductor Products, Phoenix, Arizona.

MORTON A. MEYER has been designated Chief of the Decennial Operations Division, Bureau of the Census.

JOSEPH POTTER MILLER, formerly employed with the AC Spark Plug Division of General Motors Corporation, is now a Member of the Technical Staff of the Space Technology Laboratories, Los Angeles, California.

GEORGE MINTON, formerly of the Statistical Reseach Division, has been assigned as Chief of the Quality Control Branch of the Economic Operations Division, Bureau of the Census.

AMOS MONROE MOORE has been appointed Assistant Professor of Economics at Rutgers University, New Brunswick, New Jersey.

ALLEN H. MUIR has been an Economist with the Aerojet General Corporation's Long Range Planning Division at Monterey, California, since September.

JOHN C. MUSGRAVE graduated in June from the University of Kansas with a B.A. in Mathematics and is presently studying for a Ph. D. in Statistics at the University of California, Berkeley.

JOSEPH T. NEVILLE has joined the Hercules Powder Company as a Senior Data Systems Analyst. He is assigned to the Special Projects Section.

ANNE FRANCES O'NEILL has received a National Science Foundation Science Faculty Fellowship for the year 1961-62 and is studying mathematical statistics at the University of California in Berkeley. She has a leave of absence for the year from Wheaton College in Norton, Massachusetts.

ROY V. PEEL is now Chairman of the Social Studies Division of the California Lutheran College. This is a new college located at Thousand Oaks, California.

MARGARET A. ROSS, Survey Statistician, Statistical Methods Division of the Bureau of the Census, has resigned to return to New York University.

JOHN REDMOND, Jr., formerly a Reliability Mathematician with Bendix Pacific, North Hollywood, California, has joined the Reliability Engineering Group of The Ralph M. Parsons Company, Los Angeles, California.

HARL EDGAR RYDER, Jr., is now a graduate student at Stanford University.

ALFRED M. SCHNEIDER, formerly at the Stamford Research Laboratories of American Cyanamid Company, has joined the Dewey and Almy Chemical Division, W. R. Grace & Co., Cambridge, Massachusetts, as Scientific Computer Manager.

RAY D. SEESE's new work consists of programming for an IBM 7090 for the Gulf Research and Development Company, Pittsburgh.

MELVIN F. SHAKUN is now Associate Professor of Applied and Mathematical Statistics in the Graduate School of Rutgers University, New Brunswick, New Jersey.

SIDNEY SINGER received his doctorate from Johns Hopkins University in June with a major in Operations Research, and has joined the faculty of the Industrial Engineering Department at Northwestern University as an Assistant Professor.

MORRIS J. SOLOMON has accepted an appointment as Supervisory Mathematical Statistician (Operations Research), Statistical Research Division, Bureau of the Census.

EDWIN H. SONNECKEN has resigned as President of Marplan Division, Interpublic, Inc. (McCann-Erickson) to join the Executive Staff of Goodyear Tire and Rubber Company in the office of the President.

THADDEUS H. SPRATLEN, formerly Research Assistant (part-time) at the Bureau of Business Research of Ohio State University, is now Instructor of Economics

at Western Washington State College, Bellingham, Washington.

J. F. VERIGAN has recently been transferred from the Ormet Corporation to the Organics Division of Olin Mathieson Chemical Corporation, East Alton, Illinois, as Division Manager of Quality Control.

HELEN M. WALKER is on an assignment in India with the U. S. Agency for International Development (formerly the International Cooperation Administration). She is one of the American educators who has been assigned to the newly-founded National Institute of Education under an AID-Columbia University Teachers College contract. She will help to plan the Institute's educational program.

JOEL WILLIAMS, Chief of the Statistical Operations Section of the Educational Statistics Branch, Office of Education, has returned from a year's assignment in Venezuela as a UN Statistical Adviser.

MELVIN ZELNICK, a Statistician with the Population Division of the Bureau of the Census, has accepted employment at the Office of Population Research, Princeton University.

Julius Hirsch

Dr. Julius Hirsch, a prominent economist, died on August 14, 1961 at the age of 78. He was born in Germany and received his doctorate in Economics at Bonn University. He was Secretary of Commerce in the Weimar Republic, but left Germany when Hitler came to power in 1933. After teaching for a while at the University of Copenhagen Dr. Hirsch came to the United States in 1941. He was Chief Consultant for the office of Price Administration and later became Professor of Business Administration and Director of the Business Administration Center at the New School for Social Research, New York City. Dr. Hirsch was the author of several books on economic subjects and was an economic consultant to banking, industrial and public organizations.

Edwin G. Olds

1898-1961

Edwin Glenn Olds, Professor of Mathematics at the Carnegie Institute of Technology, died October 9, 1961 of a heart attack. Professor Olds received his B.A. degree from Cornell University, and his M.A. and Ph.D. from the University of Pittsburgh. A faculty member at Carnegie for nearly forty years, he also acted as consultant to various industrial and research organizations, and during the war served as chief statistical consultant to the Office of Production Research and Development of the War Production Board. Professor Olds was a Fellow of the American Statistical Association, a Fellow and former President of the Institute of Mathematical Statistics, and a Fellow and Shewhart Medalist of the American Society for Quality Control. He was a member of the American Mathematical Society, the Biometric Society, the Mathematical Association of America, and the Research Section of the Royal Statistical Society. The author of numerous technical articles, Professor Olds was a pioneer in the application of statistical principles to the problems of industrial production.

Loring Wood

Loring Wood, Special Advisor on Response Research, Bureau of the Census, died on September 27, 1961 at the age of 51. A native Washingtonian, Mr. Wood received his B.A. degree from George Washington University in 1935. He joined the Division (now Office) of Statistical Standards of the Bureau of the Budget in 1945. In 1949 he headed the Statistics Section of the Economic Cooperation Administration Mission to France, with offices in Paris. Later he became Director of Statistics for the North Atlantic Treaty Organization. In 1956 Mr. Wood returned to the U. S. as special adviser to the Assistant Director for Statistical Standards, Bureau of the Census. He was responsible for the first comprehensive report on the quality of the 1950 Census, which contributed to significant advances in the 1960 Census methods.

FIRST COURSE IN MATHEMATICAL STATISTICS

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simpler designs in the analysis of variance which should be related to regression theory. This begins to crowd the time available but one should, if possible, illustrate the likelihood ratio principle in deriving tests and include two or three instances of nonparametic tests.

In summary, the first course in mathematical statistics should be an introduction to statistics as a discipline in its own right. It should be neither mathematics with a minimum of statistics nor statistics with a minimum of mathematics. It should be aimed at the better students who have completed a first calculus course, but not exclusively at the exceptionally gifted ones. Its choice of contents will be limited to what can be done thoroughly enough to give the students an understanding that it satisfying to them. It will be remembered that further courses in statistics and mathematics will be required before real professional competence can be acquired. But the first course will cover a useful body of statistical methodology that the students will be able to apply intelligently and even critically. A good deal of basic probability will be taught and its basic position in the structure of statistics will be kept constantly in view, but any serious attempt to make probabilists will be deferred. In fact, from the point of view of the probabilist, the course will be more than a little dirty with its discussion of real data from actual scientific investigation and its insistence that students learn how to do the necessary computation accurately and efficiently.

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